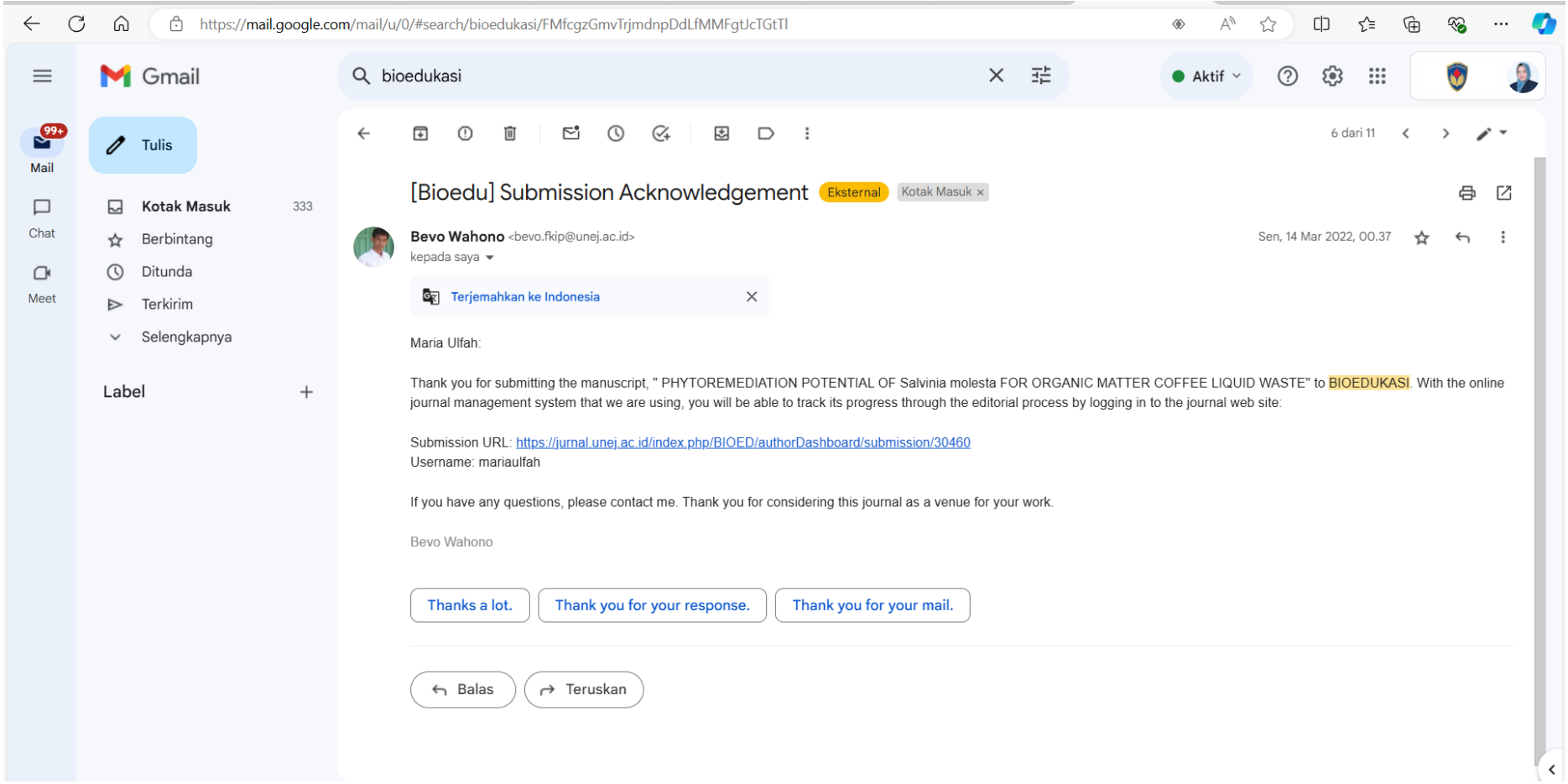
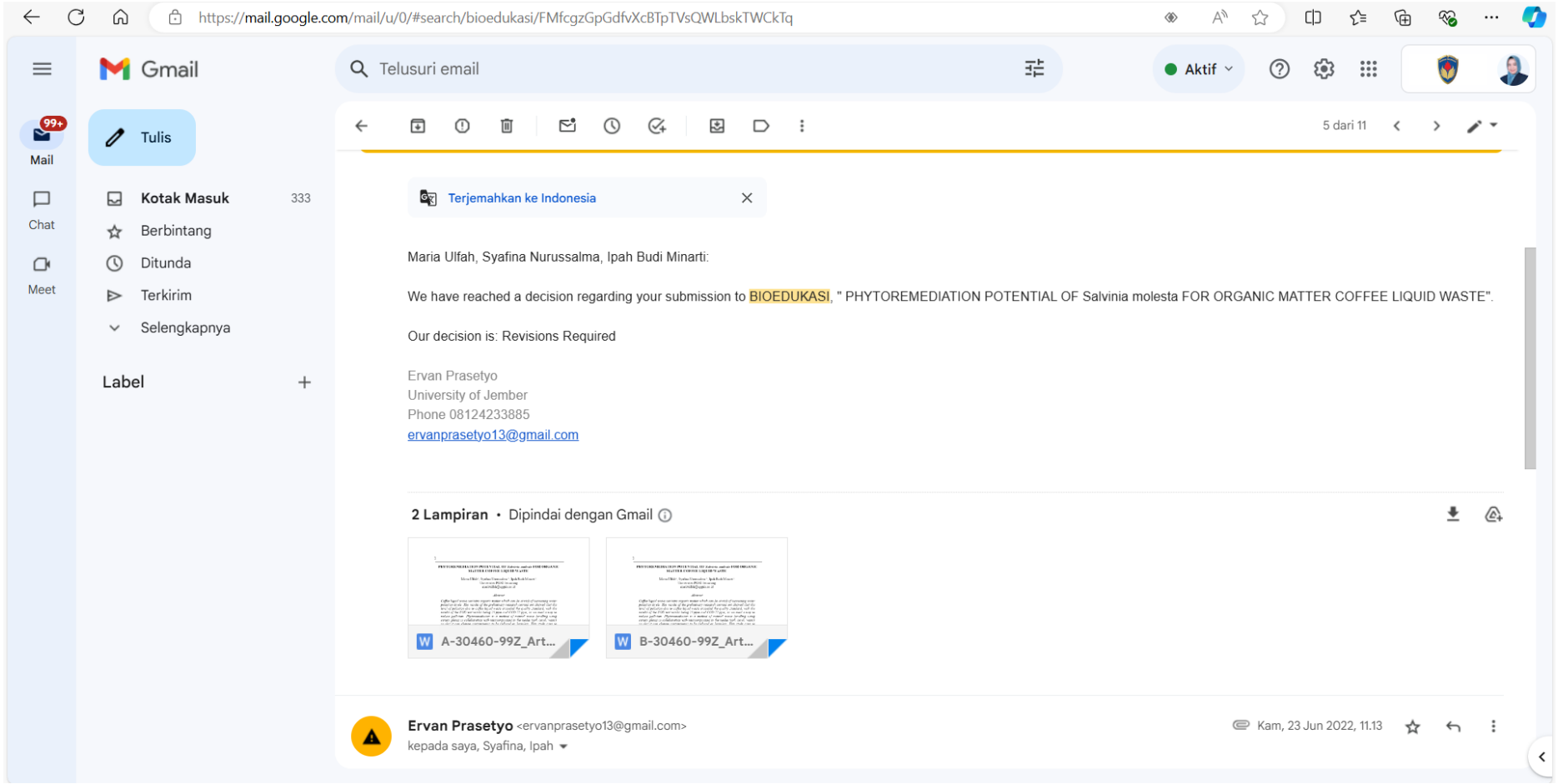
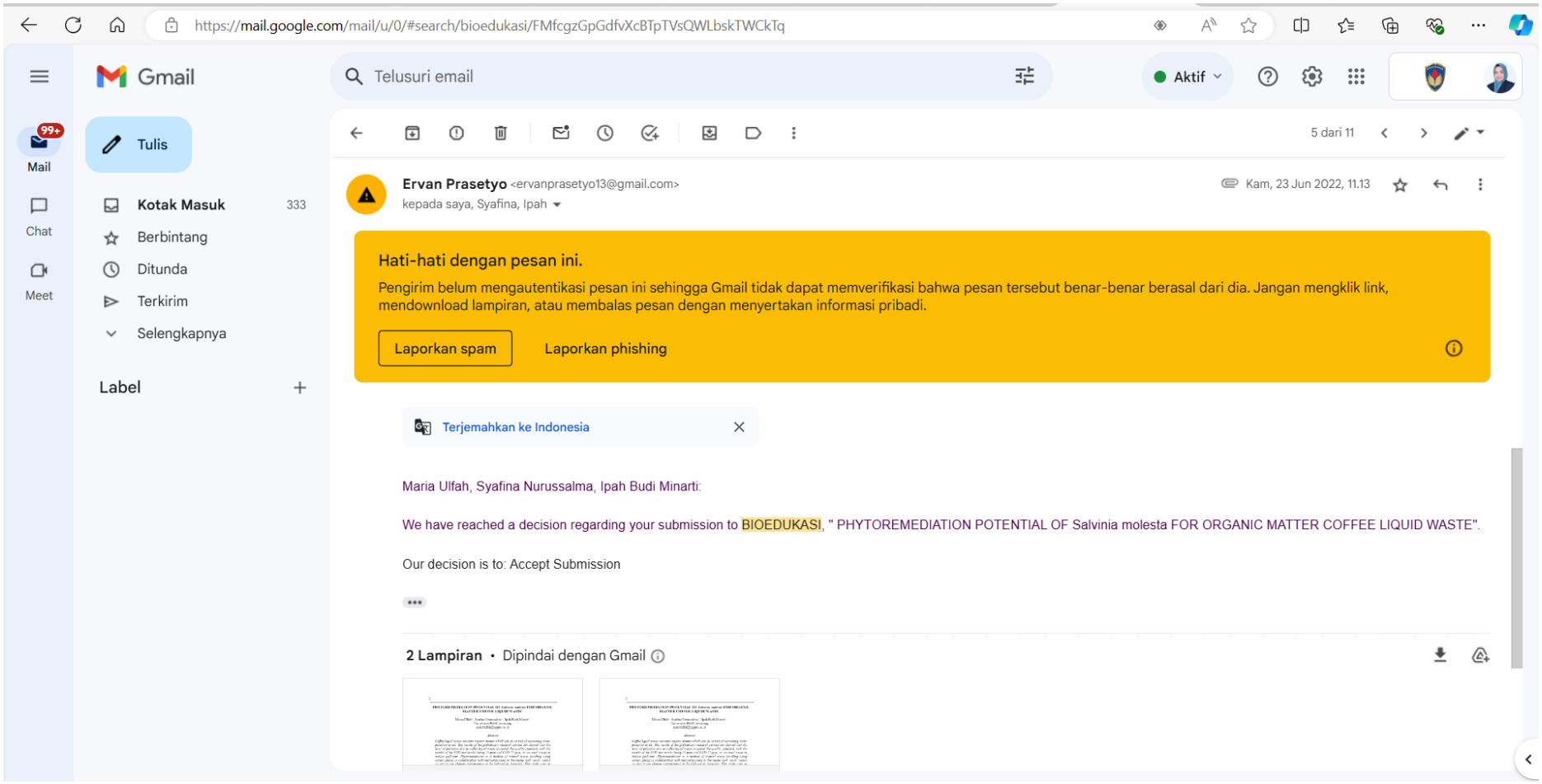
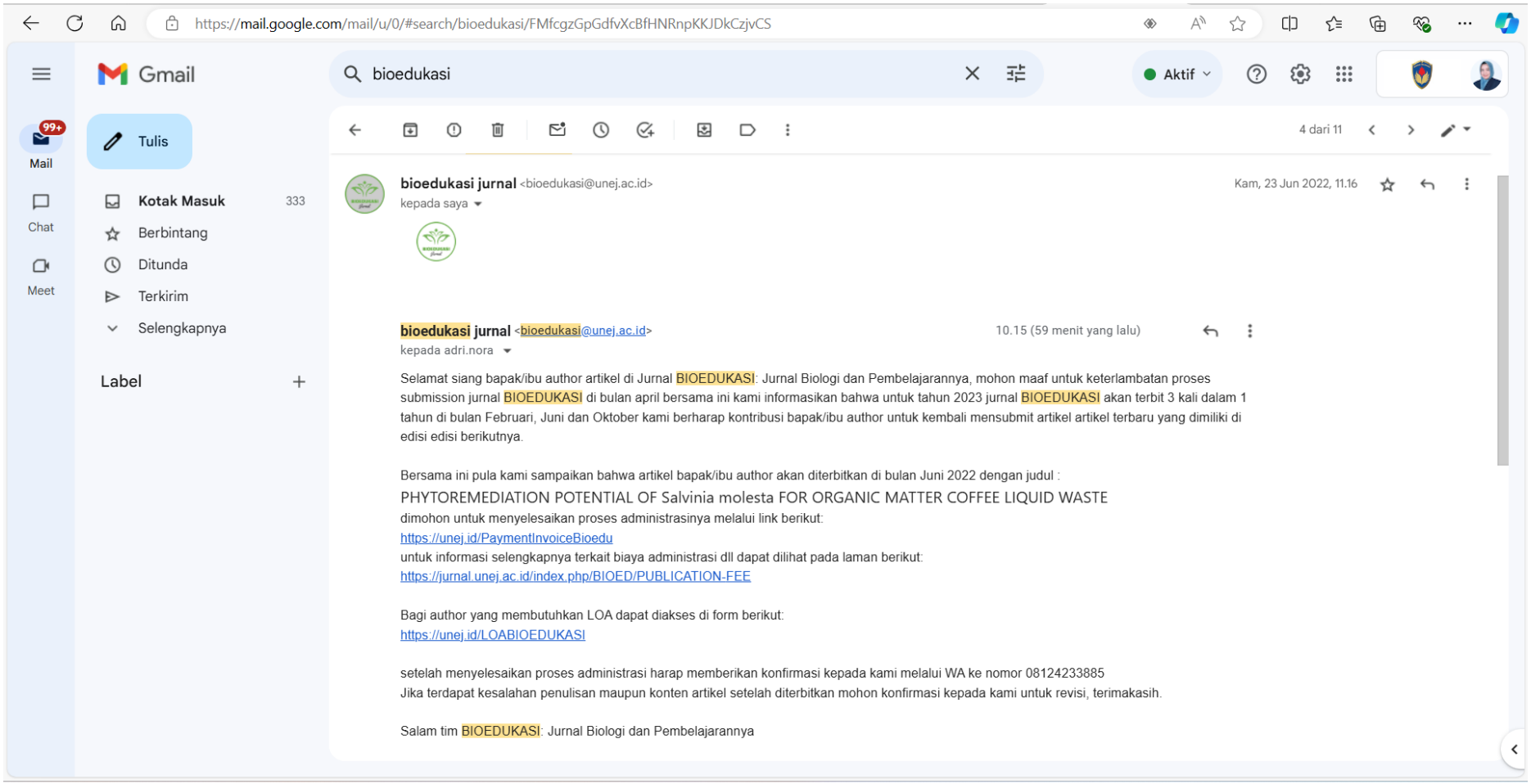
BUKTI KORESPONDENSI JURNAL BIOEDUKASI




https://mail.google.com/mail/u/0/#search/bioedukasi/FMfcgzGpGdfvXcBTpTVsQWLbskTWCkTq
Gmail
Telusuri email
Aktif
Mail
Chat
Meet
Tulis
Kotak Masuk 333
Berbintang
Ditunda
Terkirim
Selengkapnya
Label
5 dari 11
Terjemahkan ke Indonesia
Maria Ulfah, Syafina Nurussalma, Ipah Budi Minarti:
We have reached a decision regarding your submission to BIOEDUKASI, " PHYTOREMEDIATION POTENTIAL OF Salvinia molesta FOR ORGANIC MATTER COFFEE LIQUID WASTE".
Our decision is: Revisions Required
Ervan Prasetyo
University of Jember
Phone 08124233885
ervanprasetyo13@gmail.com
2 Lampiran • Dipindai dengan Gmail
A-30460-99Z_Art...
B-30460-99Z_Art...
Ervan Prasetyo <ervanprasetyo13@gmail.com>
kepada saya, Syafina, Ipah
Kam, 23 Jun 2022, 11.13


https://mail.google.com/mail/u/0/#search/bioedukasi/FMfcgzGpGdfvXcBTpTVsQWLbskTWCkTq
Gmail
Telusuri email
Aktif
Mail
Chat
Meet
Tulis
Kotak Masuk 333
Berbintang
Ditunda
Terkirim
Selengkapnya
Label
5 dari 11
Ervan Prasetyo <ervanprasetyo13@gmail.com>
kepada saya, Syafina, Ipah
Kam, 23 Jun 2022, 11.13
Hati-hati dengan pesan ini.
Pengirim belum mengautentikasi pesan ini sehingga Gmail tidak dapat memverifikasi bahwa pesan tersebut benar-benar berasal dari dia. Jangan mengklik link, mendownload lampiran, atau membalas pesan dengan menyertakan informasi pribadi.
Laporkan spam
Laporkan phishing
Terjemahkan ke Indonesia
Maria Ulfah, Syafina Nurussalma, Ipah Budi Minarti:
We have reached a decision regarding your submission to BIOEDUKASI, " PHYTOREMEDIATION POTENTIAL OF Salvinia molesta FOR ORGANIC MATTER COFFEE LIQUID WASTE".
Our decision is to: Accept Submission
2 Lampiran • Dipindai dengan Gmail


https://mail.google.com/mail/u/0/#search/bioedukasi/FMfcgzGpGdfvXcBfHNRnpKKJDkCzjvCS
Gmail
bioedukasi
Aktif
Mail
Chat
Meet
Tulis
Kotak Masuk 333
Berbintang
Ditunda
Terkirim
Selengkapnya
Label
4 dari 11
bioedukasi jurnal <bioedukasi@unej.ac.id>
kepada saya
Kam, 23 Jun 2022, 11.16
bioedukasi jurnal <bioedukasi@unej.ac.id>
kepada adri.nora
10.15 (59 menit yang lalu)
Selamat siang bapak/ibu author artikel di Jurnal BIOEDUKASI: Jurnal Biologi dan Pembelajarannya, mohon maaf untuk keterlambatan proses submission jurnal BIOEDUKASI di bulan april bersama ini kami informasikan bahwa untuk tahun 2023 jurnal BIOEDUKASI akan terbit 3 kali dalam 1 tahun di bulan Februari, Juni dan Oktober kami berharap kontribusi bapak/ibu author untuk kembali mensubmit artikel artikel terbaru yang dimiliki di edisi edisi berikutnya.
Bersama ini pula kami sampaikan bahwa artikel bapak/ibu author akan diterbitkan di bulan Juni 2022 dengan judul :
PHYTOREMEDIATION POTENTIAL OF Salvinia molesta FOR ORGANIC MATTER COFFEE LIQUID WASTE
dimohon untuk menyelesaikan proses administrasinya melalui link berikut:
https://unej.id/PaymentInvoiceBioedu
untuk informasi selengkapnya terkait biaya administrasi dll dapat dilihat pada laman berikut:
https://jurnal.unej.ac.id/index.php/BIOED/PUBLICATION-FEE
Bagi author yang membutuhkan LOA dapat diakses di form berikut:
https://unej.id/LOABIOEDUKASI
setelah menyelesaikan proses administrasi harap memberikan konfirmasi kepada kami melalui WA ke nomor 08124233885
Jika terdapat kesalahan penulisan maupun konten artikel setelah diterbitkan mohon konfirmasi kepada kami untuk revisi, terimakasih.
Salam tim BIOEDUKASI: Jurnal Biologi dan Pembelajarannya

BIOEDUKASI: Jurnal Biologi dan Pembelajarannya
STUDY PROGRAM OF BIOLOGY EDUCATION
FACULTY OF TEACHER TRAINING AND EDUCATION
UNIVERSITY OF JEMBER
Jalan Kalimantan No 37 Kampus Bumi Tegalboto Jember 68121
Phone: 0331-334988, 330738; Fax: 0331-334988

ACCEPTANCE LETTER
No:BIOEDUKASI/UNEJ/2022/0004

It's my pleasure to inform you that, after the peer review, your paper,

PHYTOREMEDIATION POTENTIAL OF Salvinia molesta FOR ORGANIC MATTER COFFEE LIQUID WASTE

(Maria Ulfah, Syafina Nurussalma, Ipah Budi Minarti)

has been ACCEPTED with content unaltered to publish with **BIOEDUKASI: Jurnal Biologi dan Pembelajarannya Vol. 20 No. 1 February 2022**, ISSN (Paper) 1693-3931 ISSN (Online) 2580-0094.

In order to fit into the publishing and printing schedule make sure to finish all the necessary payment. Please make all checks payable to Ika Lia Novenda account number MANDIRI 1430018050151, NPWP 57.240.868.0-625.000.

Though the reviewers of the journal already confirmed the quality of your paper's current version, you can still add content to it, such as solidifying the literature review, adding more content in the conclusion, giving more information on your analytical process and giving acknowledgement.

Again, thank you for working with BIOEDUKASI. I believe that our collaboration will help to accelerate the global knowledge creation and sharing one step further. We look forward to your final publication package. Please do not hesitate to contact me if you have any further questions.

23/06/2022

Sincerely,

Bevo Wahono, S.Pd., M.Pd., Ph.D., MCE.
Editor -in-Chief BIOEDUKASI
Biology Education, Faculty of Teacher Training and Education
University of Jember

Bioedukasi
Jurnal Biologi dan Pembelajarannya
Vol. xx No xx, xxxx 2022, page xxx
e-ISSN: 2580-0094; p-ISSN:1693-3931
DOI: 10.19184/bioedu.v19i2.xxxx
jurnal.unej.ac.id/index.php/BIOED

Effectiveness of Water Lilies (Zantedeschia ethiopica) as a Phytoremediation AgentBiological Oxygen Demand (BOD) and Leachate Turbidity

Maria Ulfah[1], Luhur Pujo Santoso [1], Atip Nurwahyunani [1]
[1]Biology Education, Universitas PGRI Semarang, Indonesia

Article Info
Article history:
Received January 9, 2022
Revised March 10, 2022
Accepted April 11, 2022

Keywords: (A-Z)
Biological Oxygen Demand (BOD), Effectiveness, Phytoremediation ,Turbidity, Water Lily, Leachate.

ABSTRACT (9)
Leachate is a black liquid with an unpleasant odor that contains organic and inorganic chemicals and many pathogenic bacteria that cause environmental pollution. One effort that can be done to deal with environmental pollution due to leachate is the phytoremediation technique. This study aims to determine the effectiveness of water lily (Zantedeschia aethiopica) as a biological oxygen demand (BOD) and leachate turbidity phytoremediation agent. This experimental study used a one factorial Completely Randomized Design (CRD) with three treatment levels (P0: without water lilies; P1: 200 gr water lilies; P2: 400 gr water lilies). Based on the results of the study, it was shown that water lily plants were able to reduce BOD levels and leachate turbidity, but the treatment had no significant effect. The most optimal percentage reduction in BOD levels occurred in treatment P1 on day 1 of the study, which was 9.2% with a final concentration of 464 mg/L; while the lowest percentage decrease in BOD levels occurred in the P0 treatment on the 7th day of the study, which was 1.56% with a final concentration of 502 mg/L. The most optimal percentage of turbidity reduction occurred in the P2 treatment on day 3 of the study, which was 96.23% with a final concentration of 6.3 NTU; while the lowest percentage of turbidity reduction occurred in the P0 treatment on day 1 of the study, which was 92.53% with a final level of 7.47 NTU. The leachate BOD content after the research still exceeds the quality standard set out in the Minister of Environment and Forestry of the Republic of Indonesia No. 59 of 2016, while the turbidity level of leachate after research is by the quality standards set out in the RI Minister of Health No. 32 of 2017.

Corresponding Author:
Maria Ulfah,
Biology Education, Universitas PGRI Semarang
Jalan Sidodadi Timur No 24, Kota Semarang
Email: mariaulfah@upgris.ac.id

1. INTRODUCTION

Every day human activities cannot be separated from activities that can produce waste, both organic and inorganic waste. This problem still requires special attention because rubbish left in open spaces can have negative impacts, both on the environment and health. Waste has properties that have the potential to cause pollution and health problems if not managed properly (Takwanto, 2018). Piles of rubbish can later release a black, unpleasant-smelling liquid called leachate. Leachate will appear in the layers of waste heaps and seep into the soil layers below. Leachate arises from the entry of water into waste heaps, dissolving and washing away materials, including organic materials resulting from biological decomposition (Saniyet al., 2017). Leachate is generally toxic due to the presence of pollutants and incomplete decomposition that occurs in the waste. Leachate contains organic and inorganic materials as well as pathogenic bacteria which have the potential to cause environmental pollution (Hartini & Yulianto, 2018).

Leachate produced from waste management at the Jatibarang landfill in Semarang has the potential to cause water pollution in the Kreo River because its flow is at the lower end of the landfill. The condition of the leachate pond which is leaking also plays a role in causing pollution of the Kreo River because the leachate water will flow into the river water body. The leachate collected in the holding pond will have its material content reduced through an aeration process, then the leachate will flow into the Kreo River (Kurniawatiet al., 2015). Surface water that is polluted by leachate during the biological decomposition process will deplete the oxygen

content in the water and ultimately life in the water that depends on the presence of dissolved oxygen will die (Thomas & Santoso, 2019).

Biological Oxygen Demand (BOD) and turbidity can be used as parameters in measuring water quality. The lower the BOD levels contained in a body of water, the better the quality of the water. The level of turbidity determines the amount of brightness entering the waters and is related to the need for sunlight for the assimilation process. Examination of BOD and turbidity levels is necessary to determine the pollution load that occurs.

Based on the results of Rezagama's researchet al (2017), Jatibarang Semarang landfill leachate had a BOD level of 1,200 mg/L and a turbidity of 300 NTU. The results of the latest research show that the leachate from the Jatibarang Semarang landfill has a BOD level of 1,395 mg/L and a turbidity of 300 NTU (Nofiyantoet al., 2019). Based on this research, it can be seen that the BOD levels and leachate turbidity of the Jatibarang Semarang Landfill each year exceed the quality standards stipulated in the Republic of Indonesia Minister of Environment and Forestry Regulation No. 59 of 2016 and RI Minister of Health Regulation no. 32 of 2017, where the BOD quality standard is 150 mg/L and turbidity is 25 NTU.

One effort that can be made to overcome environmental pollution due to leachate is phytoremediation. Phytoremediation is a series of processes for breaking down complex pollutants into molecules that are simpler and less harmful to the environment by utilizing plants. Phytoremediation is a technology that emerged as a result of the combined activities of plants and their association with groups of microorganisms to degrade, transfer and reduce toxic substances in soil and water (Sari, 2019).

water lily plant (Zantedeschia ethiopica) can be used as a phytoremediation agent because it is able to accumulate and decompose pollutant substances. Plants that are used as agents for absorbing heavy metals or pollutants must have phytoremediator properties, namely having hyperaccumulator properties and hypertolerance to highly polluting substances (Nofiyantoet al., 2019). In general, aquatic plants are used as aquatic phytoremediators because they have fast growth and absorption of pollutants.

This research aims to determine the effectiveness of water lilies (Zantedeschia ethiopica) as a phytoremediation agentBiological Oxygen Demand (BOD) and leachate turbidity.

2. RESEARCH METHOD

This research was carried out in February 2023 at TPA Jatibarang Semarang. Measurements of BOD levels and leachate turbidity were carried out at the Semarang City Environmental Service Laboratory. This research is an experimental study using a one-factorial Completely Randomized Design (CRD) with three treatment levels and three replications, resulting in 9 research units. The treatment given in this research was as follows:

P0: 10 liters of leachate without water lilies
P1: 10 liters of lindi + 200 gr of lily air
P2: 10 liter lindi + 400 gr lili air

Before the research, acclimatization was carried out on water lily plants (Zantedeschia ethiopica) for 1 week using distilled water which aims to make water lilies (Zantedeschia ethiopica) can adapt to new environmental conditions, so that they will not experience stress and die when they are given treatment.

The leachate samples used in this research were taken from the leachate reservoir of the Jatibarang Landfill, Semarang. Before treatment is given, a preliminary test is carried out on leachate samples to determine the initial BOD levels and leachate turbidity. Then testing was carried out again on days 1, 3 and 7 of the research to determine the development of BOD levels and leachate turbidity during the research. Data on differences in the influence between treatments on improving leachate water quality were analyzed using the Sidik Ragam test or ANOVA (Analysis of Variant). If after testing the Ragam Print analysis, treatment results are obtained that are significantly or significantly different, then further tests need to be carried out.

3. RESULT AND DISCUSSION

3.1 Initial Characteristics of Jatibarang Landfill Leachate, Semarang

The leachate from the Jatibarang Semarang landfill has a dark black color, is cloudy, and has a distinctive, strong organic aroma. Physically, the leachate from the Jatibarang Semarang Landfill appears to be completely dissolved because there is no sediment at the bottom of the research unit and there are no lumps floating on the surface of the leachate. Test results for initial BOD levels and turbidity of Jatibarang landfill leachate can be seen in Table 1.

Table 1. Initial characteristics of the Jaribarang landfill leachate in Semarang

Parameter	Unit	Kadar	Baku Mutu
BOD	mg/L	511	150
Turbidity	NTU	167	25

Based on the results of these data, it can be seen that the initial BOD levels and leachate turbidity of the Jatibarang Semarang Landfill still exceed the quality standards set in the Republic of Indonesia Minister of Environment and Forestry Regulation No. 59 of 2016 and RI Minister of Health Regulation no. 32 of 2017, where the quality standard for BOD is 150 mg/L and turbidity is 25 NTU. If this continues continuously it can cause environmental pollution.

3.2 Effectiveness of Water Lilies (Zantedeschia ethiopica) sebagai Agen Fitoremedasi BOD Leachat

Biological Oxygen Demand (BOD) is the amount of dissolved oxygen needed by microorganisms to decompose dissolved and suspended organic matter in waters (Anwar, 2019). Water lilies (Zantedeschia ethiopica) has the ability to reduce leachate BOD levels because it has properties as a hyperaccumulator and hypertolerant to pollutant substances. Data on the reduction in leachate BOD levels during treatment can be seen in Table 2 ; Table 3 ; and Table 4.

Table 2. BOD rate of leachate on the 1st day of treatment

Treatment	Average Initial Grade	Repeat BOD Levels (mg/L)			Final Grade Average	Decline Percentage (%)
		1	2	3		
P0	511	456	514	447	472,33	7,57
P1	511	453	500	439	464	9,2
P2	511	474	506	467	482,33	5,61

Table 3.BOD level of leachate on the 3rd day of treatment

Treatment	Average Initial Grade	Repeat BOD Levels (mg/L)			Final Grade Average	Decline Percentage (%)
		1	2	3		
P0	511	451	469	473	464,33	9,13
P1	511	487	512	429	476	6,85
P2	511	441	508	483	477,33	6,59

Table 4.BOD level of leachate on the 7th day of treatment

Treatment	Average Initial Grade	Repeat BOD Levels (mg/L)			Final Grade Average	Decline Percentage (%)
		1	2	3		
P0	511	502	509	498	503	1,56
P1	511	512	490	463	488,33	4,44
P2	511	499	521	486	502	1,76

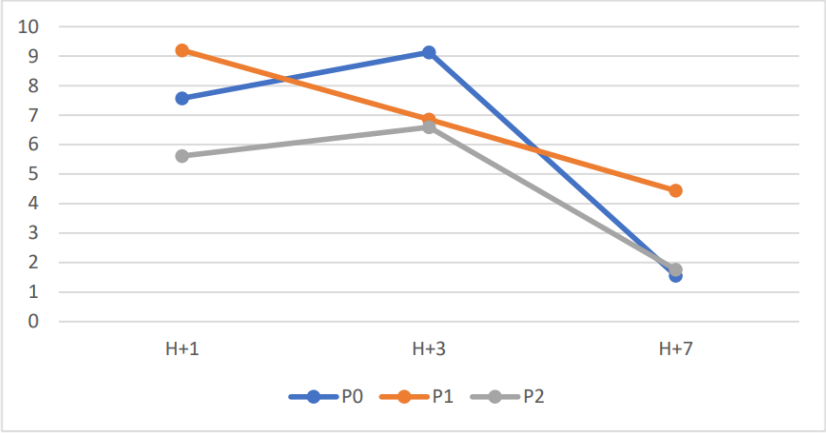


Figure 1. Graph of the effectiveness of reducing leachate BOD levels

Based on the results of these data, it can be seen that the treatment in this study did not have a significant effect. The final average leachate BOD content during the study continued to fluctuate in each treatment. The most optimal effectiveness of reducing BOD levels occurred in treatment P1 on day 1 of the study, namely 9.2% with a final level of 464 mg/L; while the effectiveness of reducing BOD levels was lowest in treatment P0 on day 7 of the study, namely 1.56% with a final level of 502 mg/L.

Hyperaccumulator plants are plants that have the ability to concentrate contaminants in their biomass at high levels (Rachmawati, 2020). Hypertolerant plants are plants that are able to adapt and survive environmental conditions with high levels of contaminants. Water lilies have dense, fibrous roots that spread in various directions so they have a high ability to absorb pollutants. Water lilies have rhizosphorus which functions to carry pollutants in the planting medium to the root cells which will then be degraded by enzymes found in the roots.

The decrease in leachate BOD levels was caused by the phytoremediation process carried out by water lilies*Rhizofiltration*. *Rhizofiltration* is the process of deposition of pollutant substances by the roots which are then translocated to the stem through transport vessels and spread to all parts of the plant (Irhamni*et al.*, 2017). In this process, the absorbed organic substances will undergo a biological reaction and accumulate in the plant stem and then be transferred to the leaves (Ahmad & Adiningsih, 2019). The ability of water lilies to absorb organic material in leachate is also due to the presence of rhizosphere microbes in the roots. Rhizosphere microbes are a form of symbiosis between bacteria and fungi that are able to break down organic and inorganic materials found in water and use them as a source of nutrition (Khaer & Nursyafitri, 2017).

In the phytodegradation process, leachate organic materials will be broken down by dehalogenase and oxygenase enzymes through plant metabolic processes. The decrease in leachate BOD levels is also a result of the phytodegradation process, where organic compounds in water that are absorbed by plant roots will experience decomposition through metabolic processes in plant organs (Fitriana & Kuntjoro, 2020). The ability of water lilies to excrete certain chemical compounds can degrade organic materials trapped in the root area and then the degraded organic materials will be easier to translocate to the stems and leaves. Water lilies do not directly absorb organic materials in leachate, but will adapt and provide conditions that allow the decomposition process of organic materials by microorganisms.

The decrease in leachate BOD levels was also caused by the presence of lactic acid bacteria (*Lactobacillus* sp.) in leachate. Lactic acid compounds can accelerate the breakdown of organic materials through an anaerobic fermentation process (Damsir*et al*., 2016). Renovating microbes will carry out the process of breaking down organic materials into simple compounds such as amino acids and fatty acids until ammonia, nitrate, nitrite and nitrogen are obtained. The longer the time for the anaerobic process to take place and the easier the organic material degradation process in the leachate to occur, the lower the leachate BOD level will be, the closer it is to the quality standard value that is safe for the environment. Therefore, during the anaerobic process, leachate BOD levels fluctuate at any time as a result of the use of organic material by microbes to be converted into body cells and other harmless compounds and some are converted into volatile materials, such as CO_2.

During the research, leachate BOD levels tended to fluctuate, indicating that the decomposition process of leachate organic material was still ongoing by microorganisms. The fluctuating increase in leachate BOD levels in treatments P1 and P2 indicates that the water lilies were less able to contribute significantly to reducing the total organic matter in the leachate. Parts of water lilies that cover the surface of the leachate will prevent sunlight from entering the bottom of the water, so that photosynthetic organisms cannot photosynthesize properly. This causes dissolved oxygen levels in the leachate to decrease, so that the decomposition process of organic material by aerobic microorganisms is disrupted. Dead plant parts become a source of aquatic organic matter. The biomass of dead water lily plants will mix with leachate, resulting in an increase in leachate organic matter and BOD levels will increase again.

The decrease in the effectiveness of water lilies in the P0 treatment in reducing leachate BOD levels was caused by the creation of hypoxic conditions due to the decreasing dissolved oxygen levels in the leachate, so that many aerobic microorganisms died and were unable to reproduce. Meanwhile, the decrease in the effectiveness of water lilies in treatments P1 and P2 in reducing leachate BOD levels was due to the plants having reached their threshold in tolerating the absorption of pollutant levels so that many plant organs died.

3.2 Effectiveness of Water Lilies (*Zantedeschia ethiopica*) as a leachate turbidity phytoremediation agent

Turbidity or*turbidity* is a condition where the transparency of a liquid is reduced due to the presence of insoluble substances (Fajri*et al*., 2014). Water turbidity levels are influenced by the presence of suspended solids, both organic and inorganic. High levels of turbidity in waters will disrupt the penetration of light entering the waters. Water lilies have the ability to reduce leachate turbidity levels because they are hyperaccumulators and hypertolerant of pollutants. Data on reducing turbidity levels in leachate during treatment can be seen in **Table 5** ; **Table 6** ; and **Table 7**.

Table 5. The turbidity rate of leachate on the 1st day of treatment

Treatment	Average Initial Grade	Repetitive Turbidity Rate (NTU)			Final Grade Average	Decline Percentage (%)
		1	2	3		
P0	167	7,8	7,71	6,9	7,47	92,53
P1	167	6,98	7,2	6,8	6,99	95,81
P2	167	6,9	7,2	6,35	6,82	95,91

Table 6. The turbidity rate of the leachate on the 3rd day of treatment

Treatment	Average Initial Grade	Repetitive Turbidity Rate (NTU)			Final Grade Average	Decline Percentage (%)
		1	2	3		
P0	167	7,12	6,8	6,72	6,88	95,88
P1	167	6,54	6,56	6,5	6,5	96,11
P2	167	6,15	6,2	6,54	6,3	96,23

Table 7. The rate of turbidity of leachate on the 7th day of treatment

Treatment	Average Initial Grade	Repetitive Turbidity Rate (NTU)			Final Grade Average	Decline Percentage (%)
		1	2	3		
P0	167	6,15	5,89	7,71	6,58	96,06
P1	167	7,26	7,09	7,09	7,15	95,72
P2	167	7,16	7,11	6,91	7,06	95,77

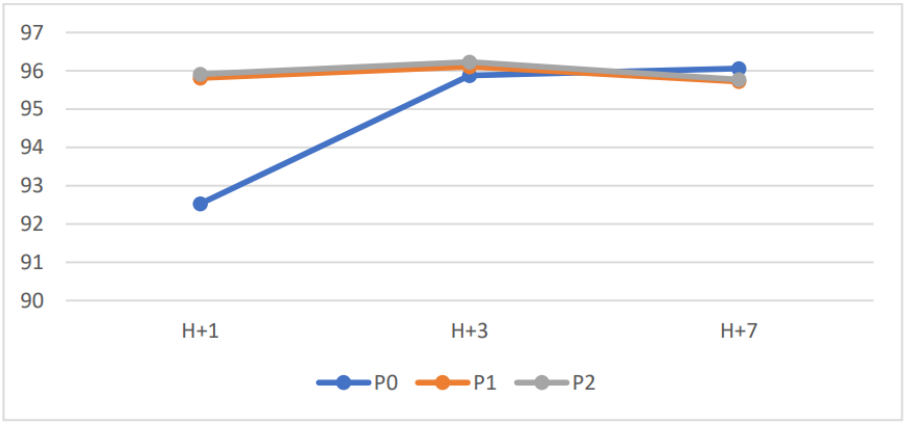


Figure 2. Graph of the effectiveness of reducing leachate turbidity levels

Based on the results of these data, it can be seen that the treatment in this study did not have a significant effect. Abilities of water lilies (Zantedeschia ethiopica) in reducing leachate turbidity levels due to its hyperaccumulator and hypertolerant properties. In this study, the most optimal percentage reduction in leachate turbidity levels occurred in treatment P2 on the 3rd day of the study, namely 96.23% with a final turbidity level of 6.3 NTU. Meanwhile, the lowest percentage reduction in leachate turbidity levels occurred in the P0 treatment on day 1 of the study, namely 92.53% with a final turbidity level of 7.47 NTU.

Suspended solids are closely related to turbidity levels, the higher the suspended solids, the higher the turbidity levels (Ahmad & Adiningsih, 2019). However, high levels of dissolved solids are not always accompanied by high levels of turbidity. Turbidity is an optical property of a solution, namely the scattering and absorption of light that can pass through it. High levels of turbidity not only endanger aquatic biota but also cause waters to become unproductive because they can prevent sunlight from entering the waters, thereby inhibiting the photosynthesis process and reducing dissolved oxygen levels in the water.

In the P0 treatment, the decrease in leachate turbidity levels occurred due to the decomposition of organic and inorganic materials carried out by microorganisms contained in the leachate. The instability of leachate turbidity levels during the research was caused by the decreasing volume of leachate and shaking when collecting leachate samples for testing, so that the sediment at the bottom of the research basin rose to the top. Meanwhile, the decrease in leachate turbidity levels in treatments P1 and P2 was caused by the ability of the roots of water lilies to absorb pollutants, both in water bodies and sediment.

The ability of water lilies to absorb organic material in leachate is also due to the presence of rhizosphere microbes. Rhizosphere microbes are a form of symbiosis between bacteria and fungi that are able to break down organic and inorganic materials in water, and use them as a source of nutrition (Khaer & Nursyafitri, 2017). The ability of water lilies and rhizospheric microbes in the roots is supported by the roots' large absorption and accumulation capacity for pollutants, causing leachate turbidity levels to decrease. Organic and inorganic materials in leachate can be reduced by rhizospheric microbes found in the roots of water lilies. In plant roots, pollutant materials are absorbed from water bodies and sediments and then accumulated in other parts of the plant (Novitaet al., 2019). The roots of the water lily plant will act as a filter in the process of absorbing colloidal particles floating in water bodies. In the rhizofiltration process, plant roots will retain solid particles contained in wastewater (Nasrullahet al., 2017). Pollutant substances will be accumulated into dissolved materials in various parts of the plant, so that the level of suspended solids in the waste is reduced (Santosoet al., 2014). Reducing the value of suspended solids will be accompanied by decreasing levels of turbidity.

Reducing turbidity levels in waters can make it easier for sunlight to penetrate into the waters, so that photosynthetic microorganisms can carry out the photosynthesis process perfectly and dissolved oxygen levels in the waters increase. Waters with high levels of dissolved oxygen can support the life of aerobic microorganisms which play a role in the decomposition process of pollutants in waters. In addition, low levels of turbidity in waters can reduce the incidence of disease in the digestive and immune systems, due to the low potential for contamination by viruses and bacteria that attach to suspended solids

4. CONCLUSION

Based on the research results, it can be concluded as follows:

a. The most optimal effectiveness of reducing BOD levels occurred in treatment P1 on day 1 of the study, namely 9.2% with a final level of 464 mg/L; while the lowest effectiveness of reducing BOD levels occurred in treatment P0 on day 7 of the study, namely 1.56% with a final level of 502 mg/L.
b. The most optimal effectiveness of reducing turbidity levels occurred in treatment P2 on the 3rd day of the study, namely 96.23% with a final level of 6.3 NTU; while the lowest effectiveness of reducing turbidity levels occurred in the P0 treatment on day 1 of the study, namely 92.53% with a final level of 7.47 NTU.

5. REFERENCES

Ahmad, H. & Adiningsih, R. 2019. Efektivitas Metode Fitoremediasi menggunakan Tanaman Eceng Gondok dan Kangkung Air dalam Menurunkan Kadar BOD dan TSS pada Limbah Cair Industri Tahu. Jurnal Farmasetis, 8(2): 31-38.

Anwar, M. H. 2019. Efektivitas Tanaman Kiambang (Pistia stratiotes L.) dalam Menurunkan Kadar BOD dan COD pada Fitoremediasi Limbah Cair Industri Tahu dan Implementasinya pada Petunjuk Praktikum Pencemaran Lingkungan. Skripsi. Universitas PGRI Semarang: Semarang.

Damsir et al. 2016. Karakteristik Lindi Hasil Fermentasi Anaerobik Sampah Kota dalam Lisimeter dan Potensi Pemanfaatannya menjadi Pupuk Cair. Jurnal Teknologi Industri Pertanian, 26(2): 125-133.

Fajri et al. 2014. Perancangan dan Penerapan Alat Ukur Kekeruhan Air Menggunakan Metode Nefelometrik pada Instalasi Pengolahan Air dengan Multi Media Card (MMC) sebagai Media Penyimpanan (Studi Kasus di PDAM Jember). Berkala Sainstek 2014, 2(1): 17-21.

Fitriana, N., & Kuntjoro, S. 2020. Kemampuan Lemna minor dalam Menurunkan Kadar Linear Alkyl Benzene Sulphonate. LenteraBio, 9(2): 109-114.

Hartini, E., & Yanto Yulianto. 2018. Kajian Dampak Pencemaran Lindi Tempat Pemrosesan Akhir (TPA) Ciangir terhadap Kualitas Air dan Udara. Jurnal Siliwangi, 4(1):27-32.

Irhamni et al. 2017. Kajian Akumulator beberapa Tumbuhan Air dalam Menyerap Zat polutan secara Fitoremediasi. Jurnal Serambi Engineering, 1(2): 75-84.

Khaer, A. & Nursyafitri, E. 2017. Kemampuan Metode Kombinasi Filtrasi Fitoremediasi Tanaman Teratai dan Eceng Gondok dalam Menurunkan Kadar BOD dan COD Air Limbah Industri Tahu. Jurnal Sulolipu: Media Komunikasi Sivitas Akademika dan Masyarakat, 17(2): 11-18.

Kurniawati, A., Ary Susatyo Nugroho, & Fibria Kaswinarni. 2015. Dampak Lindi TPA Jatibarang terhadap Keanekaragaman dan Kelimpahan Plankton di Perairan Sungai Kreo Kota Semarang. Seminar Nasional XII Pendidikan Biologi FKIP UNS 2015: 708-713.

Nasrullah S., Hayati R., & Kadaria U. 2017. Pengolahan Limbah Karet dengan Fitoremediasi Menggunakan Tanaman Typha angustifolia. Jurnal Teknol Lahan Basah, 5(1): 1-10.

Nofiyanto, E., Tri R. S., & Munifatul I. 2019. Fikoremediasi Kualitas Lindi TPA Jatibarang terhadap Efektifitas Lemna minor L. dan Ipomoea aquatica Forkks. Jurnal Ilmu Lingkungan, 17(1): 107-112.

Novita et al. 2019. Komparasi Proses Fitoremediasi Limbah Cair Pembuatan Tempe Menggunakan Tiga Jenis Tanaman Air. Jurnal Agroteknologi, 13(1): 16-24.

Novita et al. 2020. Fitoremediasi Air Limbah Laboratorium Analitik Universitas Jember dengan Pemanfaatan Tanaman Eceng Gondok dan Lembang. Jurnal Bioteknologi dan Biosains Indonesia, 7(1): 121-135.

Rachmawati, D. 2020. Fitoremediasi menggunakan Melati Air (Echinodorus palaefolius) untuk Menurunkan Logam Besi (Fe). Tugas Akhir. Universitas Islam Negeri Sunan Ampel Surabaya: Surabaya.

Rezagama, et al. 2017. Pengolahan Air Lindi TPA Jatibarang menggunakan Feton (H2O2 – Fe). Jurnal PRESIPITASI, 14(1): 30-36

Saniy, T. H., Sudarno, & Purwono. 2017. Pengolahan Lindi menggunakan Metode Koagulasi Flokulasi dengan Biokoagulan Kitosan dari Limbah Cangkang Udang dan Metode Ozonasi (Studi Kasus: Lindi TPA Jatibarang Kota Semarang). Jurnal Teknik Lingkungan, 6(1): 1-11.

Santoso et al. 2014. Pengolahan Limbah Cair Sasirangan Melalui Kombinasi Metode Filtrasi dan Fitoremediasi Sistem Lahan Basah Buatan Menggunakan Tumbuhan Air yang Berbeda. EnviroScienteae, 10(1): 157-170.

Sari, N. D. 2019. Uji Fitoremediasi pada Limbah Cair Tahu Menggunakan Genjer (Limnocharis flava L.) untuk Mengurangi Kadar Pencemaran Air sebagai Penunjang Mata Kuliah Ekologi dan Masalah Lingkungan. Skripsi. Universitas Islam Negeri Ar-Raniry: Banda Aceh.

Takwanto, A., Asalil M., & Hadi P. S. 2018. Penurunan Kandungan Polutan pada Lindi dengan Metode Elektrokoagulasi-Adsorbsi Karbon Aktif. JTKL: Jurnal Teknik Kimia dan Lingkungan, 2(1): 11-16.

Thomas, R. A., & Dian Hudawan Santoso. 2019. Potensi Pencemaran Air Lindi terhadap Air Tanah dan Teknik Pengelolaan Air Lindi di TPA Banyuroto Kabupaten Kulon Progo. Jurnal Science Tech, 5(2): 1-12.