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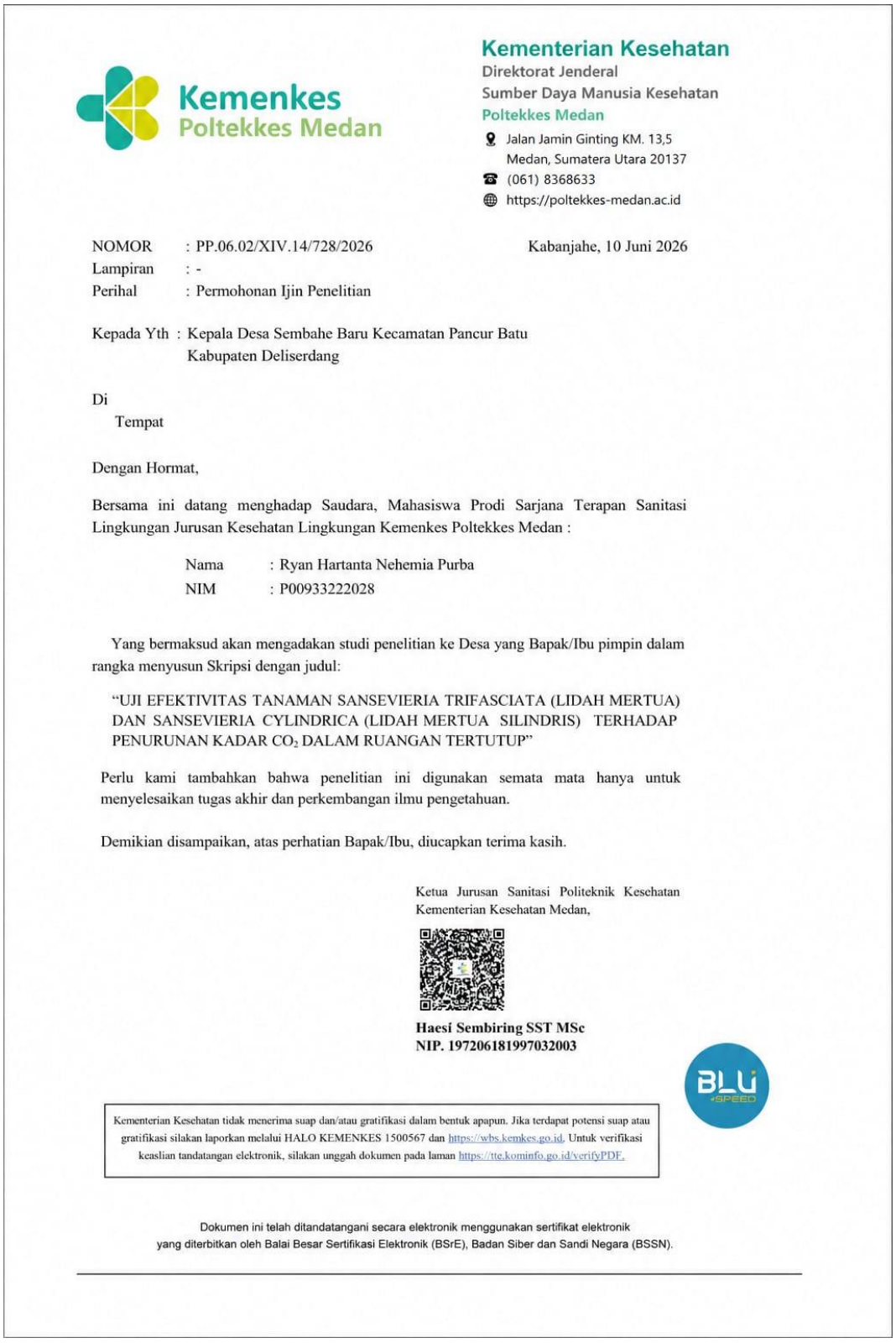
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LAMPIRAN

Lampiran 1. Surat Izin Penelitian



Kementerian Kesehatan
Direktorat Jenderal
Sumber Daya Manusia Kesehatan
Poltekkes Medan
Jalan Jamin Ginting KM. 13,5
Medan, Sumatera Utara 20137
(061) 8368633
https://poltekkes-medan.ac.id

NOMOR : PP.06.02/XIV.14/728/2026 Kabanjahe, 10 Juni 2026
Lampiran : -
Perihal : Permohonan Ijin Penelitian

Kepada Yth : Kepala Desa Sembahe Baru Kecamatan Pancur Batu
Kabupaten Deliserdang

Di
Tempat

Dengan Hormat,

Bersama ini datang menghadap Saudara, Mahasiswa Prodi Sarjana Terapan Sanitasi Lingkungan Jurusan Kesehatan Lingkungan Kemenkes Poltekkes Medan :

Nama : Ryan Hartanta Nehemia Purba
NIM : P00933222028

Yang bermaksud akan mengadakan studi penelitian ke Desa yang Bapak/Ibu pimpin dalam rangka menyusun Skripsi dengan judul:

"UJI EFEKTIVITAS TANAMAN SANSEVIERIA TRIFASCIATA (LIDAH MERTUA) DAN SANSEVIERIA CYLINDRICA (LIDAH MERTUA SILINDRIS) TERHADAP PENURUNAN KADAR CO_2 DALAM RUANGAN TERTUTUP"

Perlu kami tambahkan bahwa penelitian ini digunakan semata mata hanya untuk menyelesaikan tugas akhir dan perkembangan ilmu pengetahuan.

Demikian disampaikan, atas perhatian Bapak/Ibu, diucapkan terima kasih.

Ketua Jurusan Sanitasi Politeknik Kesehatan Kementerian Kesehatan Medan,

Haesi Sembiring SST MSc
NIP. 197206181997032003

Kementerian Kesehatan tidak menerima suap dan/atau gratifikasi dalam bentuk apapun. Jika terdapat potensi suap atau gratifikasi silakan laporkan melalui HALO KEMENKES 1500567 dan https://wbs.kemkes.go.id. Untuk verifikasi keaslian tandatangan elektronik, silakan unggah dokumen pada laman https://tte.kominfo.go.id/verifyPDF.

Dokumen ini telah ditandatangani secara elektronik menggunakan sertifikat elektronik yang diterbitkan oleh Balai Besar Sertifikasi Elektronik (BSrE), Badan Siber dan Sandi Negara (BSSN).

Lampiran 2. Dokumentasi Ruangan Penelitian



Gambar L2.1



Gambar L2.2



Gambar L2.3



Gambar L2.4

Keterangan : Foto ruangan tertutup berukuran 3 × 3,5 × 3 m dengan volume sekitar 31,5 m^3 yang digunakan sebagai lokasi penelitian, kondisi ruangan ditutup rapat pada bagian ventilasi menggunakan kardus agar menciptakan kondisi yang stabil pada saat uji eksperimen.

Lampiran 3. Dokumentasi Peneliti



Gambar L3.1

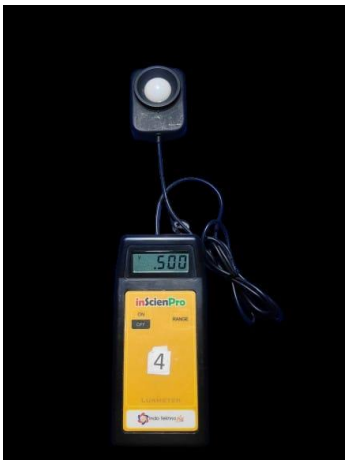


Gambar L3.2

Lampiran 4. Dokumentasi Alat Penelitian



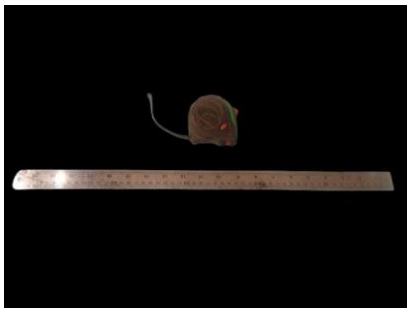
Gambar L3.1. Air Quality Monitor



Gambar L3.2. Lux Meter



Gambar L3.3. Stopwatch



Gambar L3.4. Meteran & Penggaris



Gambar L3.5. Lampu LED



Gambar L3.6. Tripod Lampu

Lampiran 5. Dokumentasi Bahan Penelitian



Gambar L4.1.
1 Pot Tanaman
Sansevieria trifasciata



Gambar L4.2.
2 Pot Tanaman
Sansevieria trifasciata



Gambar L4.3.
3 Pot Tanaman
Sansevieria trifasciata



Gambar L4.4.
1 Pot Tanaman
Sansevieria cylindrica



Gambar L4.5.
2 Pot Tanaman
Sansevieria cylindrica



Gambar L4.6.
3 Pot Tanaman
Sansevieria cylindrica

Lampiran 6. Dokumentasi Perlakuan Kontrol dan Perlakuan Tanaman



Gambar L5.1. Perlakuan Kontrol



Gambar L5.2. Perlakuan Kontrol

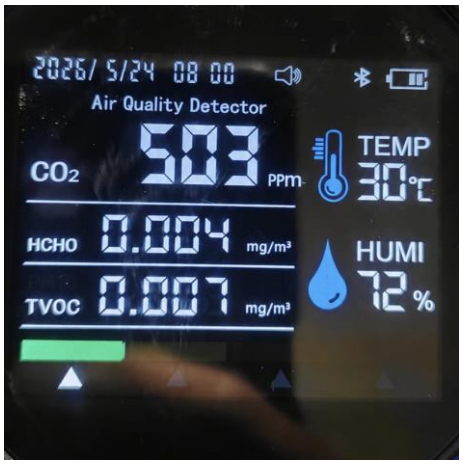


Gambar L5.3. Perlakuan Tanaman

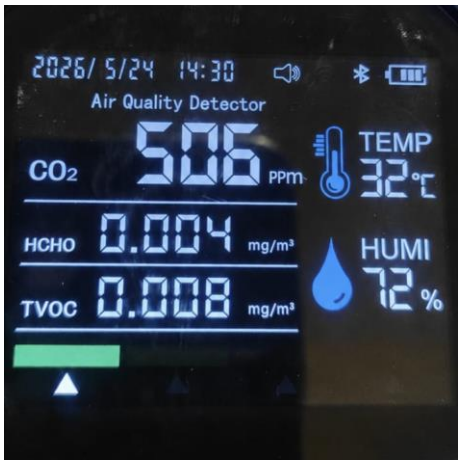


Gambar L5.4. Perlakuan Tanaman

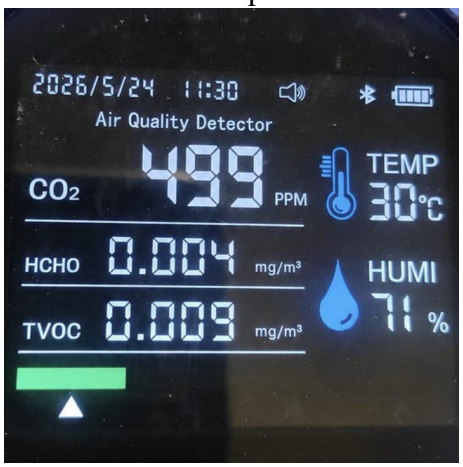
Lampiran 7. Dokumentasi Hasil Pengukuran pada Air Quality Monitor



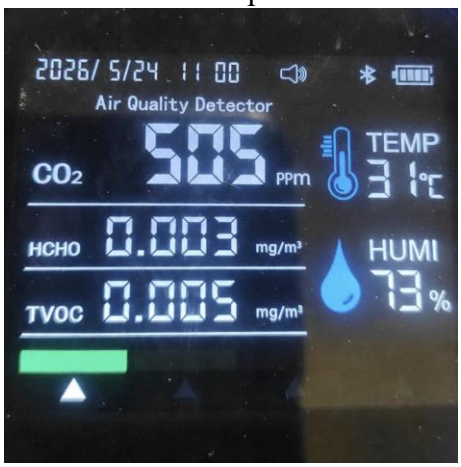
Gambar L6.1. Hasil Ukur Pretest Kontrol Replikasi 1



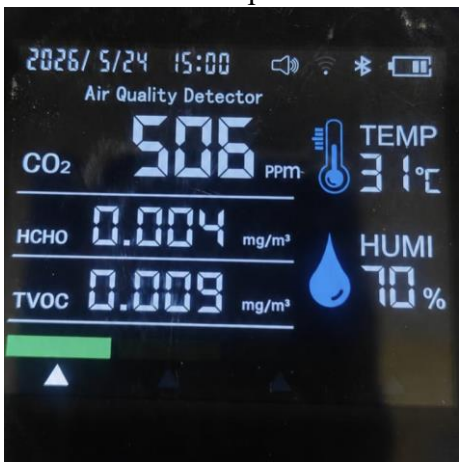
Gambar L6.2. Hasil Ukur Posttest Kontrol Replikasi 1



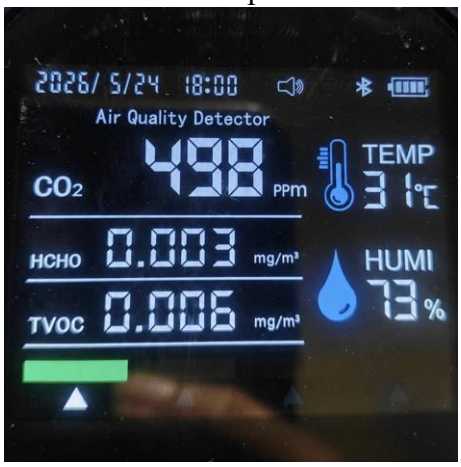
Gambar L6.3. Hasil Ukur Pretest Kontrol Replikasi 2



Gambar L6.4. Hasil Ukur Posttest Kontrol Replikasi 2



Gambar L6.5. Hasil Ukur Pretest Kontrol Replikasi 3



Gambar L6.6. Hasil Ukur Posttest Kontrol Replikasi 3



Gambar L6.7. Hasil Ukur Pretest 1 Pot *S.trifasciata* Replikasi 1



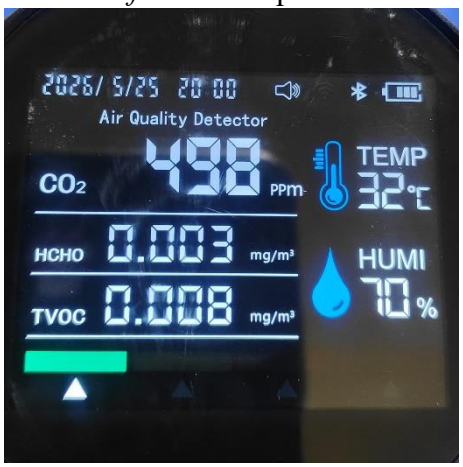
Gambar L6.8. Hasil Ukur Posttest 1 Pot *S.trifasciata* Replikasi 1



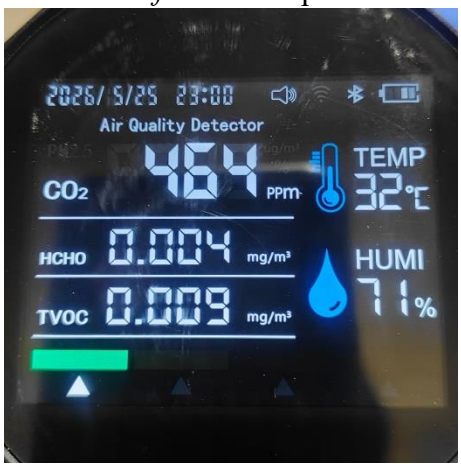
Gambar L6.9. Hasil Ukur Pretest 1 Pot *S.trifasciata* Replikasi 2



Gambar L6.10. Hasil Ukur Posttest 1 Pot *S.trifasciata* Replikasi 2



Gambar L6.11. Hasil Ukur Pretest 1 Pot *S.trifasciata* Replikasi 3



Gambar L6.12. Hasil Ukur Posttest 1 Pot *S.trifasciata* Replikasi 3



Gambar L6.13. Hasil Ukur Pretest 2 Pot *S.trifasciata* Replikasi 1



Gambar L6.14. Hasil Ukur Posttest 2 Pot *S.trifasciata* Replikasi 1



Gambar L6.15. Hasil Ukur Pretest 2 Pot *S.trifasciata* Replikasi 2



Gambar L6.16. Hasil Ukur Posttest 2 Pot *S.trifasciata* Replikasi 2



Gambar L6.17. Hasil Ukur Pretest 2 Pot *S.trifasciata* Replikasi 3



Gambar L6.18. Hasil Ukur Posttest 2 Pot *S.trifasciata* Replikasi 3



Gambar L6.19. Hasil Ukur Pretest 3 Pot *S.trifasciata* Replikasi 1



Gambar L6.20. Hasil Ukur Posttest 3 Pot *S.trifasciata* Replikasi 1



Gambar L6.21. Hasil Ukur Pretest 3 Pot *S.trifasciata* Replikasi 2



Gambar L6.22. Hasil Ukur Posttest 3 Pot *S.trifasciata* Replikasi 2



Gambar L6.23. Hasil Ukur Pretest 3 Pot *S.trifasciata* Replikasi 3



Gambar L6.24. Hasil Ukur Posttest 3 Pot *S.trifasciata* Replikasi 3



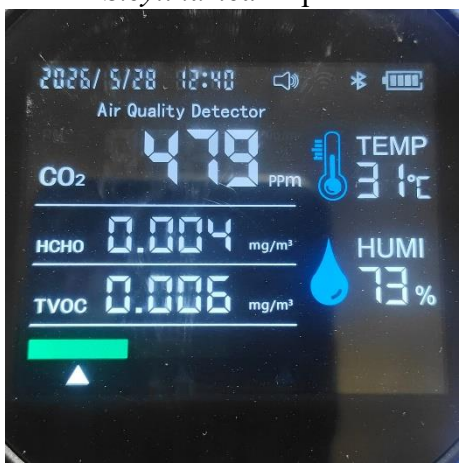
Gambar L6.25. Hasil Ukur Pretest 1 Pot *S.cylindrica* Replikasi 1



Gambar L6.26. Hasil Ukur Posttest 1 Pot *S.cylindrica* Replikasi 1



Gambar L6.27. Hasil Ukur Pretest 1 Pot *S.cylindrica* Replikasi 2



Gambar L6.28. Hasil Ukur Posttest 1 Pot *S.cylindrica* Replikasi 2



Gambar L6.29. Hasil Ukur Pretest 1 Pot *S.cylindrica* Replikasi 3



Gambar L6.30. Hasil Ukur Posttest 1 Pot *S.cylindrica* Replikasi 3



Gambar L6.31. Hasil Ukur Pretest 2 Pot *S.cylindrica* Replikasi 1



Gambar L6.32. Hasil Ukur Posttest 2 Pot *S.cylindrica* Replikasi 1



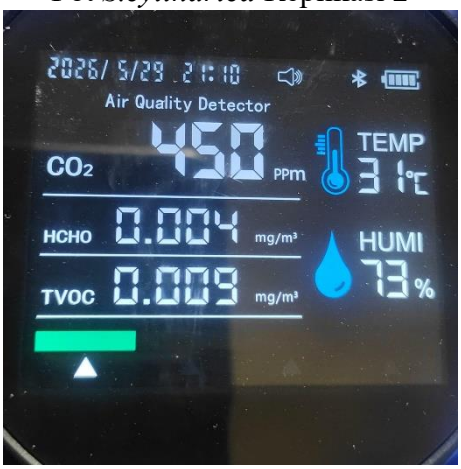
Gambar L6.33. Hasil Ukur Pretest 2 Pot *S.cylindrica* Replikasi 2



Gambar L6.34. Hasil Ukur Posttest 2 Pot *S.cylindrica* Replikasi 2



Gambar L6.35. Hasil Ukur Pretest 2 Pot *S.cylindrica* Replikasi 3



Gambar L6.36. Hasil Ukur Posttest 2 Pot *S.cylindrica* Replikasi 3



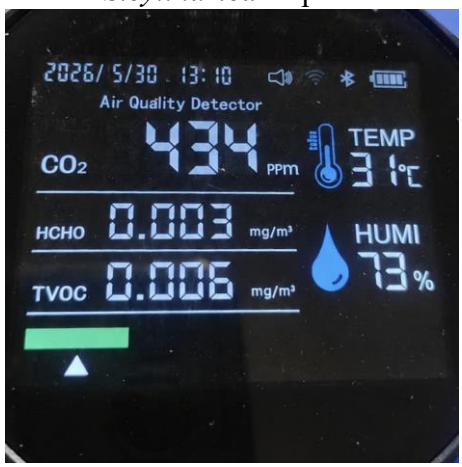
Gambar L6.37. Hasil Ukur Pretest 3 Pot *S.cylindrica* Replikasi 1



Gambar L6.38. Hasil Ukur Posttest 3 Pot *S.cylindrica* Replikasi 1



Gambar L6.39. Hasil Ukur Pretest 3 Pot *S.cylindrica* Replikasi 2



Gambar L6.40. Hasil Ukur Posttest 3 Pot *S.cylindrica* Replikasi 2



Gambar L6.41. Hasil Ukur Pretest 3 Pot *S.cylindrica* Replikasi 3



Gambar L6.42. Hasil Ukur Posttest 3 Pot *S.cylindrica* Replikasi 3

Lampiran 8. Data Mentah Hasil Pengukuran Kadar CO_2

Tabel L7.1 Data Mentah Hasil Pengukuran Kadar CO_2

No	Jenis Perlakuan	Jenis Tanaman	Jumlah Pot	Replikasi	CO_2 Awal (ppm)	CO_2 Akhir (ppm)	Penurunan CO_2 (ppm)	Persentase Penurunan (%)
1	Kontrol	Tanpa tanaman	0	K1	503	505	-2	-0,40
2	Kontrol	Tanpa tanaman	0	K2	499	506	-7	-1,40
3	Kontrol	Tanpa tanaman	0	K3	506	498	8	1,58
4	Perlakuan	*Sansevieria trifasciata*	1	R1	496	469	27	5,44
5	Perlakuan	*Sansevieria trifasciata*	1	R2	500	470	30	6,00
6	Perlakuan	*Sansevieria trifasciata*	1	R3	498	464	34	6,83
7	Perlakuan	*Sansevieria trifasciata*	2	R1	501	432	69	13,77
8	Perlakuan	*Sansevieria trifasciata*	2	R2	494	435	59	11,94
9	Perlakuan	*Sansevieria trifasciata*	2	R3	493	430	63	12,78
10	Perlakuan	*Sansevieria trifasciata*	3	R1	505	405	100	19,80
11	Perlakuan	*Sansevieria trifasciata*	3	R2	503	401	102	20,28
12	Perlakuan	*Sansevieria trifasciata*	3	R3	495	402	93	18,79
13	Perlakuan	*Sansevieria cylindrica*	1	R1	505	478	27	5,35
14	Perlakuan	*Sansevieria cylindrica*	1	R2	500	479	21	4,20
15	Perlakuan	*Sansevieria cylindrica*	1	R3	500	480	20	4,00
16	Perlakuan	*Sansevieria cylindrica*	2	R1	495	456	39	7,88
17	Perlakuan	*Sansevieria cylindrica*	2	R2	506	457	49	9,68
18	Perlakuan	*Sansevieria cylindrica*	2	R3	502	450	52	10,36
19	Perlakuan	*Sansevieria cylindrica*	3	R1	498	431	67	13,45

20	Perlakuan	*Sansevieria cylindrica*	3	R2	506	434	72	14,23
21	Perlakuan	*Sansevieria cylindrica*	3	R3	495	432	63	12,73

Keterangan :

Penurunan CO_2 = CO_2 awal - CO_2 akhir

Persentase penurunan CO_2 = (Penurunan CO_2 / CO_2 awal) × 100%

CO_2 awal = kadar CO_2 sebelum perlakuan

CO_2 akhir = kadar CO_2 setelah perlakuan selama 3 jam

ppm = parts per million

Lampiran 9. Hasil Output SPSS

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Jenis Tanaman	Statistic	df	Sig.	Statistic	df	Sig.
Penurunan CO2	cylindri	.158	9	.200*	.919	9	.386
	trifasci	.178	9	.200*	.895	9	.227

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Gambar L8.1. Hasil Output SPSS Normalitas Shapiro-Wilk

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Penurunan CO2	Based on Mean	.545	5	12	.739
	Based on Median	.141	5	12	.979
	Based on Median and with adjusted df	.141	5	8.801	.978
	Based on trimmed mean	.504	5	12	.768

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Penurunan CO2

b. Design: Intercept + Jenis + Pot + Jenis * Pot

Gambar L8.2. Hasil Output SPSS Homogenitas Varians Levene's Test

Tests of Between-Subjects Effects

Dependent Variable: Penurunan CO2

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11484.500[a]	5	2296.900	97.740	.000
Intercept	54120.500	1	54120.500	2303.000	.000
Jenis	1549.389	1	1549.389	65.931	.000
Pot	9521.333	2	4760.667	202.582	.000
Jenis * Pot	413.778	2	206.889	8.804	.004
Error	282.000	12	23.500		
Total	65887.000	18			
Corrected Total	11766.500	17			

a. R Squared = .976 (Adjusted R Squared = .966)

Gambar L8.3. Hasil Output SPSS Two Way ANOVA

Lampiran 10. Surat EC (Ethical Clearance)

Kementerian Kesehatan
Poltekkes Medan
Komisi Etik Penelitian Kesehatan
Jalan Jamin Ginting KM. 13,5
Medan, Sumatera Utara 20137
(061) 8368633
https://poltekkes-medan.ac.id

KETERANGAN LAYAK ETIK
DESCRIPTION OF ETHICAL EXEMPTION
"ETHICAL EXEMPTION"

No.01.26.4014/KEPK/POLTEKKES KEMENKES MEDAN 2026

Protokol penelitian versi 1 yang diusulkan oleh :
The research protocol proposed by

Peneliti utama : RYAN HARTANTA NEHEMIA PURBA
Principal In Investigator

Nama Institusi : POLTEKKES KEMENKES MEDAN
Name of the Institution

Dengan judul:
Title

"UJI EFEKTIVITAS TANAMAN SANSEVIERIA TRIFASCIATA (LIDAH MERTUA) DAN SANSEVIERIA CYLINDRICA (LIDAH MERTUA SILINDRIS) TERHADAP PENURUNAN KADAR CO? DALAM RUANGAN TERTUTUP"

"THE EFFECTIVENESS TEST OF SANSEVIERIA TRIFASCIATA (SNAKE PLANT) AND SANSEVIERIA CYLINDRICA (CYLINDRICAL SNAKE PLANT) IN REDUCING CO? LEVELS IN AN ENCLOSED ROOM"

Dinyatakan layak etik sesuai 7 (tujuh) Standar WHO 2011, yaitu 1) Nilai Sosial, 2) Nilai Ilmiah, 3) Pemerataan Beban dan Manfaat, 4) Risiko, 5) Bujukan/Eksploitasi, 6) Kerahasiaan dan Privacy, dan 7) Persetujuan Setelah Penjelasan, yang merujuk pada Pedoman CIOMS 2016. Hal ini seperti yang ditunjukkan oleh terpenuhinya indikator setiap standar.

Declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 Standards, 1) Social Values, 2) Scientific Values, 3) Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Concent, referring to the 2016 CIOMS Guidelines. This is as indicated by the fulfillment of the indicators of each standard.

Pernyataan Laik Etik ini berlaku selama kurun waktu tanggal 27 September 2026 sampai dengan tanggal 27 September 2027.
This declaration of ethics applies during the period September 27, 2026 until September 27, 2027.

September 27, 2026
Chairperson,

Dr. Lestari Rahmah, MKT

Lampiran 11. Lembar Perbaikan Ujian Sidang Skripsi

LEMBAR PERBAIKAN
UJIAN SIDANG SKRIPSI MAHASISWA
PRODI SARJANA TERAPAN SANITASI LINGKUNGAN
KEMENKES POLTEKKES MEDAN
TAHUN AJARAN 2025/2026

Nama : Ryan Hartanto Nathanael Purba

NIM : P00933222028

	Hal Yang Disarankan Perbaikan	Disposisi
Pembimbing TH. Teddy Barbara, SKM, M.Kes		24/7/26
Penguji I Welsa Taring SKM, M.Kes	- Latar belakang tentang kasus yg terkait sehingga ini perlu di perbaiki - Cari teori lagi di luar kos. - Saran perlu lebih dijabarkan - Perbaiki pada lapiran Hal 56 - DAFTAR PUSTAKA di perbaiki	24/7/26
Penguji II Haesti Sembiring SST, M.Sc	- Proses Fotosintesa diterbalikan di Tinjauan Pustaka. - Saran di perbaiki lagi.	

Kabanjahe, 24 Juli 2026
Ketua Jurusan Kesehatan Lingkungan

Haesti Sembiring,SST,M.Sc
NIP. 197206181997032003

Lampiran 12. Lembar Bimbingan Skripsi

KEMENTERIAN KESEHATAN POLITEKNIK KESEHATAN MEDAN

JURUSAN KESEHATAN LINGKUNGAN PRODI SARJANA TERAPAN SANITASI LINGKUNGAN
TA 2025/2026

LEMBAR BIMBINGAN SKRIPSI

Nama Mahasiswa : Rya. Hartanto Nehemia Pribo
NIM : P00933222028
Dosen Pembimbing : Th. Tetty Bambang S, SKM, M.Kes
Judul Skripsi : Uji Efektifitas Tanaman Sansevieria trifasciata (Lidah Mertua) terhadap Penurunan kadar CO_2 dalam Ruangan Tertutup

Pertemuan Ke	Hari/ Tanggal	Materi Bimbingan	Tanda Tangan Dosen
1	21 Oktober 2025	Perbaikan judul & latar	
2	24 Oktober 2025	Validasi penelitian, rumusan	
3	28 Oktober 2025	variabel	
4	4 November 2025	Persetujuan judul	
5	10 November 2025	- konsul BAB II	
6	17 November 2025	- konsul BAB II	
7	24 November 2025	- konsul BAB III	
8	1 Desember 2025	- ACC. Proposal.	
9	4 Mei 2026	Konsul BAB IV	
10	11 Mei 2026	Perbaikan BAB IV	
11	18 Mei 2026	Konsul BAB V	
12	25 Mei 2026	Perbaikan BAB V	
13	1 Juni 2026	Konsul Daftar Pustaka	
14	5 Juni 2026	Perbaikan Daftar Pustaka	
15	8 Juni 2026	ACC maju Seminar	

Ketua Jurusan Kesehatan Lingkungan
Kemenkes Poltekkes Medan

HAESTI SEMBIRING SST,MSc
NIP. 197206181997032003