DAFTAR PUSTAKA

Alam, I. P. O. A. D. C. S., Killa, N. K. S. Y. M., Wirda, W. O. A. W. R. P. C. M. A. M. Z., & Elizabeth, R. (2023). Kesuburan Tanah dan Pemupukan. Medan. In *Universitas Sumatera Utara Press, Medan* (Issue October). https://www.researchgate.net/profile/Rivandi-Putra/publication/374588185_Kesuburan_Tanah_dan_Pemupukan/links/652643df0d999b4754b82dee/Kesuburan-Tanah-dan-Pemupukan.pdf

Anetasia, M., Afandi, A., Novpriansyah, H., Manik, K. E. S., & Cahyono, P. (2013). Perubahan Kadar Air Dan Suhu Tanah Akibat Pemberian Mulsa Organik Pada Pertanaman Nanas Pt Great Giant Pineapple Terbanggi Besar Lampung Tengah. *Jurnal Agrotek Tropika*, *1*(2), 213–218. https://doi.org/10.23960/jat.v1i2.2022

Antari, R., Gulat, D., & Manurung, M. E. (2014). Pengaruh Pemberian Mulsa Organik Terhadap Sifat Fisik dan Kimia Tanah serta Pertumbuhan Akar Kelapa Sawit Effect of Organic Mulch Against Soil Physical and Chemical Properties of Palm Oil And Root Growth. *Jurnal Online Mahasiswa (JOM) Bidang Pertanian*, *1*(1), 1–13. https://jom.unri.ac.id/index.php/JOMFAPERTA/article/view/2681

Ariana, R. (2016). Hermanto, Ferry Ezra T. Sitepu, Jonatan Ginting Program. *Online Agroekoteknologi*, *2*(2337), 1–23.

Assagaf, S. A. (2020). Pengaruh Pemberian Mulsa Alang-Alang dan Pupuk NPK Phonska Terhadap Pertumbuhan dan Produksi Tanaman Tomat (Solanum lycopersicum). *Jurnal Biosainstek*, *2*(01). https://doi.org/10.52046/biosainstek.v2i01.323

Banjarnahor, S. M. (2022). Manfaat Mulsa Organik Serasah Daun Bambu Untuk Menghambat pertumbuhan Gulma Pada Tanaman Bawang Prei (Allium Porrum). *Skylandsea Profesional Jurnal Ekonomi, Bisnis Dan Teknologi*, *2*(2), 178–182.

Bhakti, R. S. G., Sarno, S., Afrianti, N. A., & Utomo, M. (2017). pengaruh Sistem Olah Tanah Dan Aplikasi Mulsa Bagas Terhadap Asam Humat Dan Fulvat Pertanaman Tebu (Saccaharum Officinarum L.) Ratoon Ke 3 Di PT Gunung Madu Plantations. *Jurnal Agrotek Tropika*, *5*(2), 119–124. https://doi.org/10.23960/jat.v5i2.1837

Darma, S., Ria, D. A. N., & Paranoan, R. (2021). Eksplorasi Jamur Pelarut Fosfat pada Tanah Masam dengan Penutup Lahan Hutan Sekunder , Padang Alang-Alang dan Perkebunan Kelapa Sawit Di Samarinda Phosphate Solubilizing Fungus Exploration in Acid Soil with a Cover of Secondary Forest Land , Grassland and. *Agroekoteknologi Tropika Lembab*, *4*, 35–41.

Erivianto, D., P, B. A., & Notosudjono, D. (2020). Penggunaan Limbah Padat Kelapa Sawit Untuk Menghasilkan Tenaga Listrik Pada Existing Boiler. *Sainstech: Jurnal Penelitian Dan Pengkajian Sains Dan Teknologi*, *26*(2), 85–93. https://doi.org/10.37277/stch.v26i2.514

Hartono, N. (2013). Pengaruh Biaya Produksi Terhadap Pendapatan Usaha Perkebunan

Kelapa Sawit (Elaeis guineensis Jacq) Di Desa Bukit Raya Kecamatan Sepaku Kabupaten Penajam Paser Utara. *Epp Educator Preparation Programs*, *10*(1), 20–27.

Herviana, D. V., Indrayatie, E. R., & Asysyifa, A. (2021). Kajian Sifat Fisik Tanah Dan Laju Infiltrasi Di Berbagai Tegakan. *Jurnal Sylva Scienteae*, *4*(5), 870. https://doi.org/10.20527/jss.v4i5.4209

Husna, M., Salamah, U., Herman, W., & Agwil, W. (2023). The Improvement of Oil Palm Seedling through Shade, Manure and Organic Liquid Fertilizer in Ultisol Media. *Planta Tropika*, *11*(1), 33–40. https://doi.org/10.18196/pt.v11i1.13415

Karina, T. P., Arianto, W., & Wiryono. (2022). Laju Dekomposisi Serasah Daun Di Kawasan Hutan Dengan Tujuan Khusus (Khdtk) Universitas Bengkulu, Bengkulu Utara. *Journal of Global Forest and Environmental Science*, *2*(2), 106–112.

Kusmana, C., & Yentiana, R. A. (2021). Laju Dekomposisi Serasah Daun Shorea guiso di Hutan Penelitian Dramaga, Bogor, Jawa Barat. *Journal of Tropical Silviculture*, *12*(3), 172–177. https://doi.org/10.29244/j-siltrop.12.3.172-177

Moelyohadi, Y. (2017). Pemanfaatan limbah perkebunan kelapa sawit sebagai kompos dan mulsa organik terhadap pertumbuhan dan produksi tanaman jagung (Zea mays L.) pada lahan kering marginal. *Jurnal Klorofil*, *12*(2), 111–119. http://jurnal.um-palembang.ac.id/klorofil/article/download/819/739

Muhammad, F. (2025). Pengaruh Penggunaan Mulsa terhadap Kelembaban Tanah dan Hasil Tanaman. *Crcle Archive*, 1–10.

Mulyono, M. (2015). Pengaruh Penggunaan Mulsa Alang-Alang, Kenikir dan Kirinyu terhadap Pertumbuhan dan Hasil Bawang Merah Di Tanah Mediteran pada Musim Penghujan. *Planta Tropika: Journal of Agro Science*, *3*(2), 73–77. https://doi.org/10.18196/pt.2015.042.73-77

Paulus, R., Mu'in, A., & Putra, D. P. (2023). Pengaruh Ketebalan Mulsa terhadap Pertumbuhan Bibit Kelapa Sawit (Elaeis guineensis Jacq) di Main Nursery Pada Jenis Tanah yang Berbeda. *Agrotechnology, Agribusiness, Forestry, and Technology: Jurnal Mahasiswa Instiper (Agroforetech)*, *1*(1), 22–30.

Purba, T., Ningsih, H., & Abdus, P. (2021). *Bukutanahdannutrisitanaman*.

Putra, D. P., Bimantio, M. P., Sahfitra, A. A., Suparyanto, T., & Pardamean, B. (2020). Simulation of availability and loss of nutrient elements in land with android-based fertilizing applications. *Proceedings of 2020 International Conference on Information Management and Technology, ICIMTech 2020*, 312–317. https://doi.org/10.1109/ICIMTech50083.2020.9211268

Putra, D. P., Nugraha, N. S., Bimantio, M. P., Suparyanto, T., & Pardamean, B. (2024). Biological Planting Media As Marginal Land Resolution With Local Bio Introduction. *Communications in Mathematical Biology and Neuroscience*, *2024*,

1–14. https://doi.org/10.28919/cmbn/8913

Rahmawati. (2020). Pengaruh Berbagai Jenis Mulsa Terhadap Pertumbuhan dan Produksi Tanaman Tomat (Lycopersicon esculentum. Mill). *Jurnal Ilmiah Agrotani*, *2*(1), 62–66.

Rosa, R. N., & Zaman, S. (2017). Pengelolaan Pembibitan Tanaman Kelapa Sawit (Elais guineensis Jacq.) Di Kebun Bangun Bandar, Sumatera Utara. *Buletin Agrohorti*, *5*(3), 325–333. https://doi.org/10.29244/agrob.v5i3.16470

Rumakuway, D., Rumahlatu, F. J., & Makaruku, M. H. (2016). Pengaruh Jenis Mulsa Organik Terhadap Pertumbuhan Dan Produksi Tanaman Sawi(Brassica juncea L .) Effects of Organic Mulch Type on Growth and Production of Mustard (Brassica juncea L .). *Jurnal Budidaya Pertanian*, *12*(2), 74–79.

Sari, V. I. (2018). Pertumbuhan Morfologi Bibit Kelapa Sawit Pre Nursery dengan Penanaman Secara Vertikultur. *Jurnal Citra Widya Edukasi*, *X*(2), 139–146.

Suherman, C., & Nugraha, R. A. (2017). Pertumbuhan bibit kelapa sawit (Elaeis guineensis jacq.) yang diberi mulsa dan fungi mikoriza arbuskula di pembibitan awal. *Prosiding Seminar Nasional*, 179–188. http://jurnal.polinela.ac.id/index.php/PROSIDING/article/view/386

Sukmawan, Y., & Riniarti, D. (2020). Respons Pertumbuhan Bibit Kelapa Sawit Akibat Pengaturan Bobot Mulsa Tandan Kosong dan Frekuensi Penyiraman. *Jurnal Penelitian Kelapa Sawit*, *28*(3), 159–168. https://doi.org/10.22302/iopri.jur.jpks.v28i3.121

Sukmawan, Y., Riniarti, D., Utoyo, B., & Rifai, A. (2019). Efisiensi Air Pada Pembibitan Utama Kelapa Sawit Melalui Aplikasi Mulsa Organik Dan Pengaturan Volume Penyiraman. *Jurnal Pertanian Presisi (Journal of Precision Agriculture)*, *3*(2), 141–154. https://doi.org/10.35760/jpp.2019.v3i2.2331

Sukmawan, Y., Sesar, A. K. R., Parapasan, Y., Riniarti, D., & Utoyo, B. (2018). Pengaruh Mulsa Organik dan Volume Air Siraman pada BeberapaSifat Kimia Tanah di Pembibitan Utama Kelapa Sawit. *Prosiding Seminar Nasional Pengembangan Teknologi Pertanian*, 273–279. http://jurnal.polinela.ac.id/index.php/PROSIDING

Tamad, Ma'as, A., Radjagukguk, B., Hanudin, E., & Widada, J. (2013). Ketersediaan Fosfor pada Tanah Andisol untuk Jagung (Zea mays L .) oleh Inokulum Bakteri Pelarut Fosfat Phosphorus Availability on Andisols for Maize (Zea mays L .) by Phosphate Solubilizing Bacteria Inoculant. *J. Agron. Indonesia*, *41*(2), 112–117.

Tampubolon, R. M., Irsal, & Charloq. (2019). Pengaruh Frekuensi Penyiraman terhadap Beberapa Jenis Bibit Unggul Kelapa Sawit (Elaeis guinensis Jacq.) yang Bermesokarp Tebal di Main Nursery Umur 4 Sampai 7 Bulan. *Jurnal Agroekoteknologi FP USU*, *7*(2), 5–24.

Usodri, K. S., Utoyo, B., & Widiyani, D. P. (2021). Pengaru KNO3 Dan Perbedaan Umur Bibit pada pertumbuhan Kelapa Sawit (Elaeis guineensis Jacq.) Di Main Nursery. *Jurnal Agrotek Tropika*, *9*(3), 423. https://doi.org/10.23960/jat.v9i3.5145

Vero Febriansyah1, githa Noviana2, P. B. H. (2024). pengaruh macam mulsa dan frekuensi penyiramaan terhadap pertumbuhan bibit kelapa sawit di main nursery. *Jurnal Mahasiswa Istiper (Agroforetech)*, 1–11.

Wardana, W., Dewi, N. A., Pambuko, A. G., Siaahan, R. R., Nugraha, S., Putra, D. P., & Suparyanto, T. (2025). Coal Ball Seed CBS : Ekonomi Sirkular Limbah Batu Bara Dalam Resolusi Reklamasi Lahan Pasca Tambang (Coal Ball Seed CBS : Circular Economy of Coal Waste in Post-Mining Land Reclamation Resolution) Indonesia merupakan salah satu produsen dan eksportir ba. *Jurnal Hutan Tropika*, *20*(1), 135–140.

Widyati, E. (2011). Pengaruh Aplikasi Mulsa Lalang (Imperata cylindrica) Terhadap Pertumbuhan Bibit Kelapa Sawit di Pembibitan Kelapa Sawit Pre Nursery. *Phys. Rev. E*, *5*, 37–43. http://www.ainfo.inia.uy/digital/bitstream/item/7130/1/LUZARDO-BUIATRIA-2017.pdf

LAMPIRAN

Lampiran 1. Sidik ragam anova tinggi tanaman

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	220.121[a]	11	20.011	1.905	.090
Intercept	68367.432	1	68367.432	6509.088	.000
Macam_mulsa	109.896	2	54.948	5.231	.013
Frekuensi_penyiraman	39.154	3	13.051	1.243	.316
Macam_mulsa * Frekuensi_penyiraman	71.071	6	11.845	1.128	.376
Error	252.081	24	10.503		
Total	68839.635	36			
Corrected Total	472.202	35			

Lampiran 2. Sidik ragam anova jumlah daun

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.581[a]	11	.144	.773	.662
Intercept	2057.681	1	2057.681	11071.398	.000
Macam_mulsa	.499	2	.250	1.343	.280
Frekuensi_penyiraman	.361	3	.120	.647	.592
Macam_mulsa * Frekuensi_penyiraman	.721	6	.120	.647	.692
Error	4.461	24	.186		
Total	2063.722	36			
Corrected Total	6.042	35			

Lampiran 3. Sidik ragam anova luas daun

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	126294.972[a]	11	11481.361	2.824	.016
Intercept	26689278.028	1	26689278.028	6565.628	.000
Macam_mulsa	98956.722	2	49478.361	12.172	.000
Frekuensi_penyiraman	2228.306	3	742.769	.183	.907
Macam_mulsa * Frekuensi_penyiraman	25109.944	6	4184.991	1.030	.431
Error	97560.000	24	4065.000		
Total	26913133.000	36			
Corrected Total	223854.972	35			

Lampiran 4. Sidik ragam anova diameter batang

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	58.559[a]	11	5.324	.404	.940
Intercept	27369.291	1	27369.291	2076.759	.000
Macam_mulsa	9.894	2	4.947	.375	.691
Frekuensi_penyiraman	11.299	3	3.766	.286	.835
Macam_mulsa * Frekuensi_penyiraman	37.366	6	6.228	.473	.822
Error	316.292	24	13.179		
Total	27744.142	36			
Corrected Total	374.852	35			

Lampiran 5. Sidik ragam anova panjang akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	392.306[a]	11	35.664	.651	.768
Intercept	98700.694	1	98700.694	1802.752	.000
Macam_mulsa	2.056	2	1.028	.019	.981
Frekuensi_penyiraman	280.972	3	93.657	1.711	.191
Macam_mulsa * Frekuensi_penyiraman	109.278	6	18.213	.333	.913
Error	1314.000	24	54.750		
Total	100407.000	36			
Corrected Total	1706.306	35			

Lampiran 6. Sidik ragam anova berat basah akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	271.222[a]	11	24.657	.323	.973
Intercept	21218.778	1	21218.778	277.672	.000
Macam_mulsa	14.389	2	7.194	.094	.910
Frekuensi_penyiraman	81.222	3	27.074	.354	.786
Macam_mulsa * Frekuensi_penyiraman	175.611	6	29.269	.383	.883
Error	1834.000	24	76.417		
Total	23324.000	36			
Corrected Total	2105.222	35			

Lampiran 7. Sidik ragam anova berat kering akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	20.254[a]	11	1.841	.582	.824
Intercept	1317.932	1	1317.932	416.821	.000
Macam_mulsa	.157	2	.079	.025	.975
Frekuensi_penyiraman	2.220	3	.740	.234	.872
Macam_mulsa * Frekuensi_penyiraman	17.876	6	2.979	.942	.484
Error	75.885	24	3.162		
Total	1414.071	36			
Corrected Total	96.139	35			

Lampiran 8. Sidik ragam anova berat basah tanaman

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1352.222[a]	11	122.929	1.263	.303
Intercept	103255.111	1	103255.111	1060.538	.000
Macam_mulsa	32.722	2	16.361	.168	.846
Frekuensi_penyiraman	262.222	3	87.407	.898	.457
Macam_mulsa * Frekuensi_penyiraman	1057.278	6	176.213	1.810	.140
Error	2336.667	24	97.361		
Total	106944.000	36			
Corrected Total	3688.889	35			

Lampiran 9. Sidik ragam anova berat kering tanaman

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	262.204[a]	11	23.837	.768	.667
Intercept	12287.722	1	12287.722	396.012	.000
Macam_mulsa	10.848	2	5.424	.175	.841
Frekuensi_penyiraman	75.274	3	25.091	.809	.502
Macam_mulsa * Frekuensi_penyiraman	176.082	6	29.347	.946	.481
Error	744.689	24	31.029		
Total	13294.615	36			
Corrected Total	1006.892	35			

Lampiran 10. Sidik ragam anova volume akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	535.417[a]	11	48.674	.356	.961
Intercept	43056.250	1	43056.250	314.726	.000
Macam_mulsa	204.167	2	102.083	.746	.485
Frekuensi_penyiraman	7.639	3	2.546	.019	.996
Macam_mulsa * Frekuensi_penyiraman	323.611	6	53.935	.394	.875
Error	3283.333	24	136.806		
Total	46875.000	36			
Corrected Total	3818.750	35			

Lampiran 11. Sidik ragam anova suhu tanah

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.431[a]	11	.130	.610	.802
Intercept	34806.499	1	34806.499	163185.212	.000
Macam_mulsa	.154	2	.077	.361	.701
Frekuensi_penyiraman	.271	3	.090	.423	.738
Macam_mulsa * Frekuensi_penyiraman	1.006	6	.168	.786	.589
Error	5.119	24	.213		
Total	34813.049	36			
Corrected Total	6.550	35			

Lampiran 12. Sidik ragam anova kelembapan tanah

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.519[a]	11	.047	.954	.510
Intercept	1121.915	1	1121.915	22696.792	.000
Macam_mulsa	.023	2	.012	.234	.793
Frekuensi_penyiraman	.157	3	.052	1.060	.384
Macam_mulsa * Frekuensi_penyiraman	.339	6	.056	1.142	.369
Error	1.186	24	.049		
Total	1123.620	36			
Corrected Total	1.705	35			

Lampiran 13. Sidik ragam anova nitrogen tanah

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	16.083[a]	11	1.462	.693	.733
Intercept	182.250	1	182.250	86.329	.000
Macam_mulsa	3.500	2	1.750	.829	.449
Frekuensi_penyiraman	5.417	3	1.806	.855	.478
Macam_mulsa * Frekuensi_penyiraman	7.167	6	1.194	.566	.753
Error	50.667	24	2.111		
Total	249.000	36			
Corrected Total	66.750	35			

Lampiran 14. Sidik ragam anova fosfor tanah

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2072.972[a]	11	188.452	2.425	.034
Intercept	63084.694	1	63084.694	811.669	.000
Macam_mulsa	302.389	2	151.194	1.945	.165
Frekuensi_penyiraman	576.528	3	192.176	2.473	.086
Macam_mulsa * Frekuensi_penyiraman	1194.056	6	199.009	2.561	.046
Error	1865.333	24	77.722		
Total	67023.000	36			
Corrected Total	3938.306	35			

Lampiran 15. Sidik ragam anova kalium tanah

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1534.889[a]	11	139.535	1.520	.188
Intercept	46081.778	1	46081.778	501.950	.000
Macam_mulsa	117.722	2	58.861	.641	.535
Frekuensi_penyiraman	817.556	3	272.519	2.968	.052
Macam_mulsa * Frekuensi_penyiraman	599.611	6	99.935	1.089	.397
Error	2203.333	24	91.806		
Total	49820.000	36			
Corrected Total	3738.222	35			

Lampiran 16. Sidik ragam anova jumlah individu gulma

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.083[a]	11	.735	1.202	.337
Intercept	6.250	1	6.250	10.227	.004
Macam_mulsa	1.500	2	.750	1.227	.311
Frekuensi_penyiraman	1.417	3	.472	.773	.521
Macam_mulsa * Frekuensi_penyiraman	5.167	6	.861	1.409	.252
Error	14.667	24	.611		
Total	29.000	36			
Corrected Total	22.750	35			

Lampiran 17. Sidik ragam anova berat basah gulma

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	893.639[a]	11	81.240	1.403	.234
Intercept	568.028	1	568.028	9.812	.005
Macam_mulsa	187.056	2	93.528	1.616	.220
Frekuensi_penyiraman	146.750	3	48.917	.845	.483
Macam_mulsa * Frekuensi_penyiraman	559.833	6	93.306	1.612	.187
Error	1389.333	24	57.889		
Total	2851.000	36			
Corrected Total	2282.972	35			

Lampiran 18. Sidik ragam anova berat kering gulma

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	98.343[a]	11	8.940	1.408	.232
Intercept	62.147	1	62.147	9.786	.005
Macam_mulsa	20.537	2	10.269	1.617	.219
Frekuensi_penyiraman	16.112	3	5.371	.846	.482
Macam_mulsa * Frekuensi_penyiraman	61.694	6	10.282	1.619	.185
Error	152.420	24	6.351		
Total	312.910	36			
Corrected Total	250.763	35			