DAFTAR PUSTAKA

Akbari, W. A. (2015). Pemanfaatn Limbah Kulit Pisang Mucuna bracteata sebagai Pupuk Kompos. *Jurnal Teknologi Lingkungan Lahan Basah*, *3*(1), 1620–1626. https://doi.org/10.26418/jtllb.v3i1.11424

Alfiyah, F., Y. Nugroho., & G. S. Rudy (2020). Pengaruh Kelas Lereng dan Tutupan Lahan terhadap Solum Tanah, Kedalaman Efektif Akar dan pH Tanah. *Jurnal Sylva Scienteae*, *3*(3), 499. https://doi.org/10.20527/jss.v3i3.2183

Ariyanto. (2010, March 26). Klasifikasi Struktur Tanah. *Universitas Sebelas Maret*. https://ariyanto.staff.uns.ac.id/files/2010/03/kesuburan-04b.pdf

Azhari. (2024). *Pembibitan Kelapa Sawit: Rahasia Memperoleh Bibit yang Jagur*. Bhuana Ilmu Populer.

Brady, N. C., & Weil, R. R. (2017). *The Nature and Properties of Soils* (15th ed.). Pearson Education. https://www.researchgate.net/publication/301200878_The_Nature_and_Properties_of_Soils_15th_edition

Brouwer, P., H. Schluepmann., K. G. Nierop., J. Elderson., P. K. Bijl., van der Meer, I., de Visser, W., G. Reichart., S. Smeekens., & A. Van Der Werf. (2018). Growing Azolla to Produce Sustainable Protein Feed: The Effect of CO_2 and Harvesting Regime on Biomass Productivity and Chemical Composition. *Journal of the Science of Food and Agriculture*, *98*(12), 4759–4768. https://doi.org/10.1002/jsfa.9016

Budi, W. S., Winarko, F. Rokhmalia., Darjati, & S. Poerwati. (2023). Analisis Kandungan Nitrogen, Fosfor, Kalium pada Humus di Tanah ada Tempat Penampungan Sementara. *Jurnal Penelitian Kesehatan*, *14*(1). https://forikes-ejournal.com/index.php/SF/article/view/sf14113

Darmawijaya. (1992). *Klasifikasi Tanah, Dasar Teori bagi Peneliti Tanah dan Pelaksanaan Pertanian di Indonesia*. Kanisius.

Eghball, B. (2002). Soil Properties as Influenced by Phosphorus- and Nitrogen-Based Manure and Compost Applications. *Agronomy Journal*, *94*(1), 128–135. https://doi.org/10.2134/agronj2002.1280

Fathin, S. L., E. D. Purbajanti& E. Fuskhah. (2019). Pertumbuhan dan hasil Kailan (Brassica oleracea var. Alboglabra) pada berbagai dosis pupuk kambing dan frekuensi pemupukan Nitrogen. *Jurnal Pertanian Tropik*, *6*(3), 438–447. https://doi.org/10.32734/jpt.v6i3.3193

Fauzi. Y, Y. E., I. Widyastuti & R. H. Satyawibawa (2007). *Kelapa Sawit : Budidaya, Pemanfaatan Hasil dan Limbah, Analisis Usaha dan Pemasaran*.

Ginting, N. A., N. Ginting., I. Sembiring & S. Sinulingga (2021). Effect of Eco Enzymes Dilution on the Growth of Turi Plant (Sesbania grandiflora). *Jurnal Peternakan Integratif*, *9*(1), 29–35. https://doi.org/10.32734/jpi.v9i1.6490

Goh, K., & R. Härdter (2003). *General Oil Palm Nutrition*. International Potash Institute Kassel. https://www.researchgate.net/publication/284701489_General_oil_palm_nutrition

Halim, A. (2020). Pengolahan Limbah Ayam Petelur Sebagai Pupuk Organik. *Seminar Nasional Ilmu Peternakan Terapan*, 182–185. https://doi.org/10.25047/proc.anim.sci.2020.26

Hanafiah, K. A. (2005). *Dasar-Dasar Ilmu Tanah*. Raja Grafindo Persada.

Hardjowigeno, S. (2010). *Ilmu Tanah*. Akademika Pressindo.

Hartatik, W., H. Husnain & L. R. Widowati (2015). Peranan Pupuk Organik Dalam Peningkatan Produktivitas Tanah Dan Tanaman. *Jurnal Sumberdaya Lahan*, *9*(2), 107–120. https://www.neliti.com/publications/140352/

Indriani, Y. H. (2011). *Membuat Kompos secara Kilat*. Penebar Swadaya.

Intara, Y. I., A. D. Nusantara., S. Supanjani., Z. Caniago., & R. Ekawita (2018). Oil Palm Roots Architecture in Response to Soil Humidity. *International Journal of Oil Palm*, *1*(2), 79–89. https://ijop.id/index.php/ijop/article/view/11

Komariah Ito, K., M. Senge., J. T. Adomako & Afandi. (2008). The Influences of Organic Mulches on Soil Moisture Content and Temperatures : A Case Study of Tapioca Wastes Application. *Journal of Rainwater Catchment Systems*, *14*(1), 1–8. https://doi.org/10.7132/jrcsa.KJ00004978336

Kuncarawati, L., S. Husen., & M. Rukhiyat (2003). Aplikasi Teknologi Pupuk Organik Azolla pada Budidaya Tanaman Padi Sawah di Desa Tegal Gondo Kecamatan Krangploso Malang. *Jurnal Dedikasi*, *1*(1), 94–99.

Marzouk, S. H., H. J. Tindwa., N. A. Amuri., & J. M. Semoka (2023). An overview of underutilized benefits derived from Azolla as a promising biofertilizer in lowland rice production. *Heliyon*, *9*(1), e13040. https://doi.org/10.1016/j.heliyon.2023.e13040

Nadalia, D., & H. B. Pulunggon (2020). Soil characteristics of post-mining reclamation land and natural soil without top soil. *Journal of Degraded and Mining Lands Management*, *7*(2), 2011–2016. https://doi.org/10.15243/jdmlm.2020.072.2011

Nasution, M. H., I. A. Mahbub & Z. Gani, (2015). *Respon Pertumbuhan Bibit Kakao (Theobroma cacao L.) terhadap Pemberian Biochar Sekam Padi dan Kompos Kulit Kopi pada Tanah Sub Soil Di Polybag* [Artikel ilmiah tidak dipublikasikan]. Universitas Jambi.

Nazari, Y. A., Fakhrurrazie, N. Aidawati., & Gunawan. (2015). Deteksi Perakaran Kelapa Sawit Pada Lubang Biopori Modifikasi Dengan Metode Geolistrik Resistivitas. *Ziraa Majalah Ilmiah Pertanian*, *40*(1). https://www.researchgate.net/publication/402581924_Deteksi_Perakaran_Kelapa_Sawit_Pada_Lubang_Biopori_Modifikasi_Dengan_Metode_Geolistrik_Resistivitas

Ni'mah, G. K., & A. Hidayatullah (2017). *Analisa Kandungan Hara Pupuk Hijau Azolla dan Pakis dari Vegetasi Lahan Gambut di Anjir Muara Barito Kuala. Dalam Prosiding Hasil Penelitian Dosen UNISKA Tahun 2017* . Universitas Islam Kalimantan.

Nora, S., & C. D. Mual (2018). *Budidaya Tanaman Kelapa. Badan Penyuluhan dan Pengembangan SDM Pertanian, Kementerian Pertanian*. Kementerian Pertanian.

Nur, T., A. R. Noor., & M. Elma (2016). Pembuatan Pupuk Organik Cair Dari Sampah Organik Rumah Tangga Dengan Bioaktivator EM4 (Effective Microorganisms). *Konversi*, *5*(2), 5. https://doi.org/10.20527/k.v5i2.4766

Nurlaila, & Hendri. (2019). Komposisi Media Tanam Pada Pembibitan Tanaman Karet (Hevea Brasiliensis). *Jurnal Agriment*, *4*(01), 1–5. https://doi.org/10.51967/jurnalagriment.v4i01.157

Rizky Agro. (2021, December 28). Peranan Pupuk Organik terhadap Sifat Fisika, Kimia, dan Biologi Tanah. *Rizky Agro*. https://rizkiagro.com/blog/peranan-pupuk-organik-terhadap-sifat-fisika-kimia-dan-biologi-tanah/

Samekto. R. (2006). *Pupuk Kompos*. PT Citra Aji Parama.

Schoonover, J. E., & J. F. Crim (2015). An Introduction to Soil Concepts and the Role of Soils in Watershed Management. *Journal of Contemporary Water Research & Education*, *154*(1), 21–47. https://doi.org/10.1111/j.1936-704X.2015.03186.x

Simanjuntak, L. (2005). *Usaha Tani Terpadu Pati*. AgroMesia Pustaka.

Suharno, I. Mawardi., Setiabudi, N. Lunga., & S. Tjitrosemito (2007). Efisiensi Penggunaan Nitrogen pada Tipe Vegetasi yang Berbeda di Stasiun Penelitian Cikaniki, Taman Nasional Gunung Halimun Salak, Jawa Barat. *Biodiversitas Journal of Biological Diversity*, *8*(4). https://doi.org/10.13057/biodiv/d080409

Sutanto, R. (2002). *Penerapan Pertanian Organik Pemasyarakatan dan Pengembangannya*. Kanisius.

Sutarta, E. S., Winarna, & M. A. Yusuf (2017). Distribusi Hara Dalam Tanah dan Produksi Akar Tanaman Kelapa Sawit pada Metode Pemupukan yang Berbeda. *Jurnal Pertanian Tropik*, *4*(1), 84–94. https://doi.org/10.32734/jpt.v4i1.3074

Woittiez, L S. Turhina, D. Deccy, M. Slingerland, M. Van Noordwijk, & K. E. Giller (2018). Fertilizer Aplication Practices and Nutrient Deficiences in Smalhollder Oil Palm Plantations in Indonesia. *Nutrient Cycling in Agroecosystems*, *111*(1), 73–86. https://doi.org/10.1007/s10705-018-9919-5

Yang, Y., Y. Yang., S. Deng., & Z. Ying. (2025). Role of Azolla in sustainable agriculture and climate resilience: a comprehensive review. *Frontiers in Plant Science*, *16*. https://doi.org/10.3389/fpls.2025.1661720

Yudistina, V., M. Santoso., & N. Aini. (2017). Hubungan antara Diameter Batang dengan Umur Tanaman terhadap Pertumbuhan dan Hasil Tanaman Kelapa Sawit. *Buana Sains*, *17*(1), 43. https://doi.org/10.33366/bs.v17i1.577

Yuliprianto, H. (2010). *Biologi Tanah dan Strategi Pengelolaannya*. Graha Ilmu. Yogyakarta.

Lampiran

Lampiran 1. Sidik Ragam Pertambahan Tinggi Bibit

Tests of Between-Subjects Effects

Dependent Variable: Tinggi_Tanaman

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	72.130[a]	8	9.016	1.301	.285
Intercept	1128.960	1	1128.960	162.909	.000
Pupuk_Organik	33.485	2	16.743	2.416	.108
Lapisan_Tanah	.412	2	.206	.030	.971
Pupuk_Organik * Lapisan_Tanah	38.233	4	9.558	1.379	.267
Error	187.110	27	6.930		
Total	1388.200	36			
Corrected Total	259.240	35			

a. R Squared = ,278 (Adjusted R Squared = ,064)

Lampiran 2. Sidik Ragam Pertambahan Diameter Batang

Tests of Between-Subjects Effects

Dependent Variable: Diameter_Batang

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	143.650[a]	8	17.956	1.448	.223
Intercept	10712.250	1	10712.250	863.582	.000
Pupuk_Organik	51.522	2	25.761	2.077	.145
Lapisan_Tanah	35.295	2	17.647	1.423	.259
Pupuk_Organik * Lapisan_Tanah	56.833	4	14.208	1.145	.357
Error	334.920	27	12.404		
Total	11190.820	36			
Corrected Total	478.570	35			

a. R Squared = ,300 (Adjusted R Squared = ,093)

Lampiran 3. Sidik Ragam Pertambahan Jumlah Daun

Tests of Between-Subjects Effects

Dependent Variable: Jumlah_Daun

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.000[a]	8	1.000	1.080	.406
Intercept	841.000	1	841.000	908.280	.000
Pupuk_Organik	1.500	2	.750	.810	.455
Lapisan_Tanah	1.167	2	.583	.630	.540
Pupuk_Organik * Lapisan_Tanah	5.333	4	1.333	1.440	.248
Error	25.000	27	.926		
Total	874.000	36			
Corrected Total	33.000	35			

Lampiran 4. Sidik Ragam Berat Segar Tajuk

Tests of Between-Subjects Effects

Dependent Variable: Berat_Segar_Tajuk

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5670.264[a]	8	708.783	1.633	.162
Intercept	151066.960	1	151066.960	347.995	.000
Pupuk_Organik	2238.212	2	1119.106	2.578	.094
Lapisan_Tanah	189.138	2	94.569	.218	.806
Pupuk_Organik * Lapisan_Tanah	3242.914	4	810.729	1.868	.145
Error	11720.868	27	434.106		
Total	168458.092	36			
Corrected Total	17391.132	35			

Lampiran 5. Sidik Ragam Berat Segar Akar

Tests of Between-Subjects Effects

Dependent Variable: Berat_Segar_Akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2940.068[a]	8	367.508	3.049	.014
Intercept	40865.296	1	40865.296	338.982	.000
Pupuk_Organik	1074.181	2	537.091	4.455	.021
Lapisan_Tanah	47.959	2	23.980	.199	.821
Pupuk_Organik * Lapisan_Tanah	1817.927	4	454.482	3.770	.015
Error	3254.935	27	120.553		
Total	47060.299	36			
Corrected Total	6195.002	35			

a. R Squared = ,475 (Adjusted R Squared = ,319)

Lampiran 5. 2 DMRT Berat Segar Akar

Berat_Segar_Akar

Duncan[a,b]

Pupuk_Organik	N	Subset 1	Subset 2
P1	12	27.3350	
P3	12	33.0692	33.0692
P2	12		40.6717
Sig.		.212	.101

Berat_Segar_Akar

Duncan[a]

PUPUKORGANIKxLAPISANTANAH	N	Subset for alpha = 0.05		
		1	2	3
P1S2	4	22,0850		
P1S1	4	22,8550		
P3S2	4	25,8850	25,8850	
P3S3	4	31,6600	31,6600	
P2S1	4	33,0600	33,0600	
P1S3	4	37,0650	37,0650	37,0650
P2S3	4	37,0675	37,0675	37,0675
P3S1	4		41,6625	41,6625
P2S2	4			51,8875
Sig.		,103	,083	,091

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 4.000.

Lampiran 6. Sidik Ragam Berat Kering Tajuk

Tests of Between-Subjects Effects

Dependent Variable: Berat_Kering_Tajuk

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	430.357[a]	8	53.795	1.470	.214
Intercept	11170.728	1	11170.728	305.162	.000
Pupuk_Organik	181.645	2	90.823	2.481	.103
Lapisan_Tanah	13.063	2	6.532	.178	.838
Pupuk_Organik * Lapisan_Tanah	235.649	4	58.912	1.609	.201
Error	988.358	27	36.606		
Total	12589.444	36			
Corrected Total	1418.715	35			

Lampiran 7. Sidik Ragam Berat Kering Akar

Tests of Between-Subjects Effects

Dependent Variable: Berat_Kering_Akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	135.754[a]	8	16.969	1.595	.173
Intercept	1793.522	1	1793.522	168.586	.000
Pupuk_Organik	14.935	2	7.467	.702	.504
Lapisan_Tanah	4.337	2	2.168	.204	.817
Pupuk_Organik * Lapisan_Tanah	116.482	4	29.121	2.737	.049
Error	287.244	27	10.639		
Total	2216.520	36			
Corrected Total	422.997	35			

Lampiran 7.1 DMRT Berat Kering Akar

Berat_Kering_Akar

Duncan[a]

PUPUKORGANIKxLAPISANTANAH	N	Subset for alpha = 0.05	
		1	2
P3S2	4	4,223	
P1S1	4	5,193	5,193
P1S2	4	5,520	5,520
P3S3	4	6,173	6,173
P2S1	4	6,785	6,785
P2S3	4	7,103	7,103
P1S3	4	8,633	8,633
P3S1	4		9,938
P2S2	4		9,960
Sig.		,106	,084

Means for groups in homogeneous subsets are displayed.

Lampiran 8. Sidik Ragam Panjang Akar

Tests of Between-Subjects Effects

Dependent Variable: Panjang_Akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1341.165[a]	8	167.646	2.141	.067
Intercept	61404.840	1	61404.840	784.331	.000
Pupuk_Organik	1196.802	2	598.401	7.643	.002
Lapisan_Tanah	95.085	2	47.543	.607	.552
Pupuk_Organik * Lapisan_Tanah	49.278	4	12.320	.157	.958
Error	2113.815	27	78.289		
Total	64859.820	36			
Corrected Total	3454.980	35			

a. R Squared = ,388 (Adjusted R Squared = ,207)

Lampiran 8.2 DMRT Panjang Akar

Duncan[a,b]

Pupuk_Organik	N	Subset 1	Subset 2
P1	12	34.792	
P3	12	40.300	
P2	12		48.808
Sig.		.139	1.000

Lampiran 9. Sidik Ragam Volume Akar

Tests of Between-Subjects Effects

Dependent Variable: Volume_Akar

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1884.722[a]	8	235.590	1.824	.116
Intercept	38677.778	1	38677.778	299.441	.000
Pupuk_Organik	343.056	2	171.528	1.328	.282
Lapisan_Tanah	9.722	2	4.861	.038	.963
Pupuk_Organik * Lapisan_Tanah	1531.944	4	382.986	2.965	.038
Error	3487.500	27	129.167		
Total	44050.000	36			
Corrected Total	5372.222	35			

a. R Squared = ,351 (Adjusted R Squared = ,158)

Lampiran 9.2 DMRT Volume Akar

Volume_Akar

Duncan[a]

PUPUKORGANIKxLAPISANTANAH	N	Subset for alpha = 0.05	
		1	2
P3S2	4	23,75	
P1S1	4	25,00	
P1S2	4	26,25	
P2S1	4	31,25	31,25
P2S3	4	31,25	31,25
P3S3	4	33,75	33,75
P1S3	4	35,00	35,00
P3S1	4	42,50	42,50
P2S2	4		46,25
Sig.		,052	,110

Means for groups in homogeneous subsets are displayed.

Lampiran 10. Sidik Ragam Luas Daun

Tests of Between-Subjects Effects

Dependent Variable: Luas_Daun

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	38881.245[a]	8	4860.156	1.273	.298
Intercept	5478829.676	1	5478829.676	1434.705	.000
Pupuk_Organik	34684.408	2	17342.204	4.541	.020
Lapisan_Tanah	2250.178	2	1125.089	.295	.747
Pupuk_Organik * Lapisan_Tanah	1946.658	4	486.665	.127	.971
Error	103107.158	27	3818.784		
Total	5620818.079	36			
Corrected Total	141988.403	35			

a. R Squared = ,274 (Adjusted R Squared = ,059)

Lampiran 10. 2 DMRT Luas Daun

Luas_Daun

Duncan[a,b]

Pupuk_Organik	N	Subset 1	Subset 2
P1	12	349.7075	
P3	12	395.4658	395.4658
P2	12		425.1717
Sig.		.081	.249

Lampiran 11. Sidik Ragam Kandungan Klorofil Daun

Tests of Between-Subjects Effects

Dependent Variable: Kandungan_Klorofil_Daun

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	698.649[a]	8	87.331	1.517	.198
Intercept	76775.174	1	76775.174	1333.736	.000
Pupuk_Organik	193.767	2	96.884	1.683	.205
Lapisan_Tanah	119.521	2	59.760	1.038	.368
Pupuk_Organik * Lapisan_Tanah	385.361	4	96.340	1.674	.185
Error	1554.227	27	57.564		
Total	79028.050	36			
Corrected Total	2252.876	35			

a. R Squared = ,310 (Adjusted R Squared = ,106)

Lampiran 12. Rangkuman Hasil Sidik Ragam (ANOVA)

Parameter Pengamatan	Lapisan Tanah	Pupuk Organik	Interaksi
Pertambahan Tinggi Bibit (cm)	NS	NS	-
Pertambahan Diameter Batang (mm)	NS	NS	-
Pertambahan Jumlah Daun (helai)	NS	NS	-
Berat Segar Tajuk (g)	NS	NS	-
Berat Segar Akar (g)	S	NS	+
Berat Kering Tajuk (g)	NS	NS	-
Berat Kering Akar (g)	NS	NS	+
Panjang Akar (cm)	S	NS	-
Volume Akar (ml)	NS	NS	+
Luas Daun (cm^2)	S	NS	-
Kandungan Klorofil Daun (SPAD)	NS	NS	-

Keterangan :
NS : Non Signifikan
S : Signifikan
- : Tidak Terjadi Interaksi
+ : Tejadi Interaksi