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DAFTAR PUSTAKA

Acevedo, E., Galindo-Castañeda, T., Prada, F., Navia, M., & Romero, H. M. (2014). Phosphate-solubilizing microorganisms associated with the rhizosphere of oil palm (Elaeis guineensis Jacq.) in Colombia. *Applied Soil Ecology*, *80*, 26–33. https://doi.org/10.1016/J.APSOIL.2014.03.011

Adiningsih, E. S., Sofan, P., & Prasasti, I. (2016). Pemanfaatan Teknologi Penginderaan Jauh untuk Monitoring Kejadian Iklim Ekstrem di Indonesia The Applications of Remote Sensing Technology for Extreme Climate Monitoring in Indonesia. *Jurnal Sumberdaya Lahan*, *10*(2), 67–78.

Adiwiganda, R., Koedadiri, A. D., & Pulungan, Z. (1993). Karakterisasi Tanah Spodosol pada Formasi Geologi Minas. *Buletin PPKS* , *1*(2), 163–173.

Afgan, N. H. (2008). Sustainability Concept for Energy, Water and Environment Systems. *Sustainable Energy Technologies: Options and Prospects*, 25–49. https://doi.org/10.1007/978-1-4020-6724-2_2

Agusta, H., Pratanu, B. G., Saragih, J. F., Handoyo, G. C., & Sulistiyono, E. (2020). The Dynamics of Precipitation and its Relation to Flowering Status and Oil Palm Productivity. *IOP Conference Series: Earth and Environmental Science*, *418*(1), 1–8. https://doi.org/10.1088/1755-1315/418/1/012043

Agustiana, S., Wandri, R., & Asmono, D. (2018). Tantangan dan Solusi Pengembangan PAJALE dan Kelapa Sawit Generasi Kedua (Replanting) di Lahan Suboptimal" Performa Tanaman Kelapa Sawit pada Musim Kering di Sumatera Selatan; Pengaruh Defisit Air Terhadap Fenologi Tanaman. *Prosiding Seminar Nasional Lahan Suboptimal 2018*, 67–73.

Ajiputra, Y. A., & Primananda, S. (2017). PENILAIAN EVALUASI KESUBURAN TANAH AREAL PERKEBUNAN WILMAR INTERNATIONAL PLANTATION CENTRAL KALIMANTAN PROJECT TAHUN 2017 Soil Fertility Assesment of Wilmar International Plantation Central Kalimantan Project Area Final Report 2017. In *R&D WIlmar International Region Kalimantan Tengah*.

Akram, H., Levia, D. F., Herrick, J. E., Lydiasari, H., & Schütze, N. (2022). Water requirements for oil palm grown on marginal lands: A simulation approach. *Agricultural Water Management*, *260*, 107292. https://doi.org/10.1016/J.AGWAT.2021.107292

Ali, F., Sarwar, A., Ilahi Bakhsh, F., Ahmad, S., Ali Shah, A., & Ahmed, H. (2023). Parameter extraction of photovoltaic models using atomic orbital search algorithm on a decent basis for novel accurate RMSE calculation. *Energy Conversion and Management*, *277*, 116613. https://doi.org/10.1016/J.ENCONMAN.2022.116613

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Ali, Z., Merrium, S., Habib-ur-Rahman, M., Hakeem, S., Saddique, M. A. B., & Sher, M. A. (2022). Wetting mechanism and morphological adaptation; leaf rolling enhancing atmospheric water acquisition in wheat crop—a review. *Environmental Science and Pollution Research*, *29*(21), 30967–30985. https://doi.org/10.1007/s11356-022-18846-3

Allen, M. J., Grieve, S. W. D., Owen, H. J. F., & Lines, E. R. (2022). Tree Species Classification From Complex Laser Scanning Data in Mediterranean Forests Using Deep Learning. *Methods in Ecology and Evolution*, 1–11. https://doi.org/10.1111/2041-210X.13981

Al-Taisan, W. A., & Gabr, D. G. (2017). Comparative Morphological And Anatomical Characters of Cakile Arabica from Different Habitat in Eastern Region of Saudi Arabia. *Saudi Journal of Biological Sciences*, *24*(1), 226–233. https://doi.org/10.1016/j.sjbs.2016.04.009

An, N., Tang, C.-S., Xu, S.-K., Gong, X.-P., Shi, B., & Inyang, H. I. (2018). Effects of Soil Characteristics on Moisture Evaporation. *Engineering Geology*, *239*, 126–135. https://doi.org/10.1016/j.enggeo.2018.03.028

An, N., Tang, C.-S., Xu, S.-K., Gong, X.-P., Shi, B., & Inyang, H. I. (2019). Experimental Study of Moisture Evaporation Process with Different Soil Characteristics. *Japanese Geotechnical Society Special Publication*, *7*(2), 78–83. https://doi.org/10.3208/jgssp.v07.011

Anam, K. (2016). *Karakteristik Tanah Spodosol Dari Kalimantan Timur*. Institut Pertanian Bogor.

Anderle, M., Paniccia, C., Brambilla, M., Hilpold, A., Volani, S., Tasser, E., Seeber, J., & Tappeiner, U. (2022). The Contribution of Landscape Features, Climate and Topography in Shaping Taxonomical and Functional Diversity of Avian Communities an A Heterogeneous Alpine Region. *Oecologia*, *199*, 499–512. https://doi.org/10.1007/s00442-022-05134-7

Anjani, I. A., Pratiwi, Y. R., & Norfa Bagas Nurhuda, S. (2021). Implementation of Deep Learning Using Convolutional Neural Network Algorithm for Classification Rose Flower. *International Conference on Science Education and Technology (ICOSETH) 2020*, *1842*(1), 1–12. https://doi.org/10.1088/1742-6596/1842/1/012002

Anuar, A. R., Goh, K. J., Heoh, T. B., & Ahmed, O. H. (2008). Spatial-Temporal Yield Trend of Oil Palm as Influenced by Nitrogen Fertilizer Management`. *American Journal of Applied Sciences*, *5*(10), 1376–1383. https://doi.org/10.3844/ajassp.2008.1376.1383

Ardiansyah, E. Y., Tibri, T., Fitrah, A., Azan, S., & Sembiring, J. A. (2019). Analisa Pengaruh Sifat Fisik Tanah Terhadap Laju Infiltrasi Air. *Seminar Nasional Teknik 2019*, *April*, 86–90.

UNIVERSITAS
GADJAH MADA
**Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Ardiyanto, A. (2020). *Karakteristik Sifat Fisika Tanah dalam Hubungannya dengan Produktivitas Kelapa Sawit Pada Berbagai Jenis Tanah di Kalimantan*. Institute Pertanian Bogor.

Arifin, M., Herdiansyah, G., Sandrawati, A., & Devnita, R. (2021). Karakterisasi dan Klasifikasi Ultisols yang Berkembang dari Dua Bahan Induk di Kabupaten Serang. *Soilrens*, *19*(2), 33–42.

Ariyanti, M., Yahya, S., Murtilaksono, K., Suwarto, & Siregar, H. H. (2016). Water Balance in Oil Palm Plantation with Ridge Terrace and Nephrolepis Water Balance in Oil Palm Plantation with Ridge Terrace and Nephrolepis biserrata as Cover Crop. *Journal of Tropical Crop Science*, *3*(2), 35–55. www.j-tropical-crops.com

Aryani, Y., & Gustian, D. (2020). Sistem Informasi Penjualan Barang Dengan Metode Regresi Linear Berganda dalam Prediksi Pendapatan Perusahaan. *Jurnal Sistem Informasi Dan Teknologi Informasi*, *2*(2), 39–51.

Asfour, M., Menon, C., & Jiang, X. (2022). Feature–Classifier Pairing Compatibility for sEMG Signals in Hand Gesture Recognition under Joint Effects of Processing Procedures. *Bioengineering*, *9*(11), 1–18. https://doi.org/10.3390/bioengineering9110634

Ayanda, A. F., Jusop, S., Ishak, C. F., & Othman, R. (2020). Utilization of Magnesium-Rich Synthetic Gypsum as Magnesium Fertilizer for Oil Palm Grown on Acidic Soil. *PLOS ONE*, *15*(6), e0234045. https://doi.org/10.1371/journal.pone.0234045

Azhar, A. T. S., Nabila, A. T. A., Nurshuhaila, M. S., Zaidi, E., Azim, M. A. M., & Zahin, A. M. F. (2016). Novel Technique to Improve the pH of Acidic Barren Soil using Electrokinetic-bioremediation with the Application of Vetiver Grass. *IOP Conference Series: Materials Science and Engineering*, *160*(1), 12076. https://doi.org/10.1088/1757-899x/160/1/012076

Aziz, N. A., Omar, W., Kassim, R., & Kamarudin, N. (2012). *Remote Sensing Measurement for Detection of Bagworm Infestation in Oil Palm Plantation*.

Azri, M. H., Ismail, S., & Abdullah, R. (2018). An endophytic Bacillus strain promotes growth of oil palm seedling by fine root biofilm formation. *Rhizosphere*, *5*, 1–7. https://doi.org/10.1016/J.RHISPH.2017.10.003

Azzeme, A. M., Abdullah, S. N. A., Aziz, M. A., & Wahab, P. E. M. (2016). Oil Palm Leaves and Roots Differ in Physiological Response, Antioxidant Enzyme Activities and Expression of Stress-Responsive Genes Upon Exposure to Drought Stress. *Acta Physiologiae Plantarum*, *38*(2). https://doi.org/10.1007/s11738-016-2073-2

Badgley, C., Smiley, T. M., Terry, R., Davis, E. B., DeSantis, L. R. G., Fox, D. L., Hopkins, S. S. B., Jezkova, T., Matocq, M. D., Matzke, N., McGuire, J. L., Mulch, A., Riddle, B. R., Roth, V. L., Samuels, J. X., Strömberg, C. A. E., & Yanites, B. J. (2017). Biodiversity and Topographic Complexity: Modern and Geohistorical

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Perspectives. In *Trends in Ecology and Evolution* (Vol. 32, Issue 3, pp. 211–226). Elsevier Ltd. https://doi.org/10.1016/j.tree.2016.12.010

Balasundram, S. K., Memarian, H., Khosla, R., & Khosla, R. (2013). Estimating Oil Palm Yields Using Vegetation Indices Derived from Quickbird. *Life Science Journal*, *10*(4), 1097–8135. http://www.lifesciencesite.comhttp://www.lifesciencesite.com.109

Balittanah. (2004). *Petunjuk Teknis Pengamatan Tanah*. Badan Penelitian dan Pengembangan Pertanian, Departemen Pertanian.

Bandura, A. V, & Lvov, S. N. (2006). The Ionization Constant of Water over Wide Ranges of Temperature and Density. *J. Phys. Chem. Ref. Data*, *35*(1). https://doi.org/10.1063/1.1928231

Barus, J., Meithasari, D., Lumbanraja, J., Sudarsono, H., Hidayat, K. F., & Dermiyati. (2021). Soil mesofauna amount and diversity by returning fresh and compost of crops biomass waste in ultisols in-situ. *Biodiversitas*, *22*(1), 92–98. https://doi.org/10.13057/biodiv/d220113

Bayona-Rodríguez, C. J., & Romero, H. M. (2016). Estimación de la Transpiración en Palma de aceite (Elaeis guineensis Jacq.) por el método del radio de calor. *Agronomia Colombiana*, *34*(2), 172–178. https://doi.org/10.15446/agron.colomb.v34n2.55649

Bayona-Rodriguez, C. J., & Romero, H. M. (2019). Physiological and agronomic behavior of commercial cultivars of oil palm (Elaeis guineensis) and OxG hybrids (Elaeis oleifera x Elaeis guineensis) at rainy and dry seasons. *Australian Journal of Crop Science*, *13*(3), 424–432. https://doi.org/10.21475/ajcs.19.13.03.p1354

Beretta-Blanco, A., Pérez, O., & Carrasco-Letelier, L. (2019). Soil Quality Decrease over 13~years of Agricultural Production. *Nutrient Cycling in Agroecosystems*, *114*(1), 45–55. https://doi.org/10.1007/s10705-019-09990-3

Berg, A., & Sheffield, J. (2019). Historic and Projected Changes in Coupling Between Soil Moisture and Evapotranspiration (ET) in CMIP5 Models Confounded by the Role of Different ET Components. *Journal of Geophysical Research: Atmospheres*, *124*(11), 5791–5806. https://doi.org/10.1029/2018jd029807

Bibi, H., Afzal, M., Kamal, M., Ullah, I., Mulk Khan, S., Ali Sher, A., Ullah, I., Ali, A., Ali Khan, S., & Ur Rahman, I. (2015). Morphological and Anatomical Characteristics of Selected Dicot Xerophytes of District Karak, Khyber Pakhtunkhwa, Pakistan. *Middle-East Journal of Scientific Research*, *23*(4), 545–557. https://doi.org/10.5829/idosi.mejsr.2015.23.04.12583

Bintoro, A., Widjajanto, D., & Isrun. (2017). Karakteristik Fisik Tanah Pada Beberapa. *E-J. Agrotekbis*, *5*(4), 423–430.

Bohluli, M., Teh, C. B. S., & Rahman, Z. A. (2012). The Effectiveness of Silt Pit as a Soil, Nutrient and Water Conservation Method in Non-Terraced Oil Palm

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Plantations. *Proceedings of the Soil Science Conference of Malaysia*, 138–144. https://www.researchgate.net/publication/304856350

Bouguettaya, A., Zarzour, H., Kechida, A., & Taberkit, A. M. (2022). Deep Learning Techniques to Classify Agricultural Crops Through UAV Imagery: A Review. In *Neural Computing and Applications* (Vol. 34, Issue 12, pp. 9511–9536). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/s00521-022-07104-9

Brum, M., Oliveira, R. S., López, J. G., Licata, J., Pypker, T., Chia, G. S., Tinôco, R. S., & Asbjornsen, H. (2021). Effects of Irrigation on Oil Palm Transpiration During ENSO-Induced Drought in the Brazilian Eastern Amazon. *Agricultural Water Management*, *245*. https://doi.org/10.1016/j.agwat.2020.106569

Buchmann, C., & Schaumann, G. E. (2018). The Contribution of Various Organic Matter Fractions to Soilwater Interactions and Structural Stability of an Agriculturally Cultivated Soil. *Journal of Plant Nutrition and Soil Science*, *181*(4), 586–599. https://doi.org/10.1002/jpln.201700437

Bui, F., Lelang, M. A., & Taolin, R. I. C. O. (2015). Pengaruh Komposisi Media Tanam dan Ukuran Polybag Terhadap Pertumbuhan dan Hasil Tomat (Licopercicum escelentum, Mill). *Jurnal Pertanian Konservasi Lahan Kering*, *1*(1), 1–7.

Cahill, L., Patton, D., Reilly, B., Pierce, K. M., & Horan, B. (2023). Grazing season length and stocking rate affect milk production and supplementary feed requirements of spring-calving dairy cows on marginal soils. *Journal of Dairy Science*, *106*(2), 1051–1064. https://doi.org/10.3168/JDS.2021-21244

Cai, G., Carminati, A., Abdalla, M., & Ahmed, M. A. (2021). Soil Textures Rather than Root Hairs Dominate Water Uptake and Soil-Plant Hydraulics Under Drought. *Plant Physiology*, *187*, 858–872. https://doi.org/10.1093/plphys/kiab271

Ćalasan, M., Abdel Aleem, S. H. E., & Zobaa, A. F. (2020). On the root mean square error (RMSE) calculation for parameter estimation of photovoltaic models: A novel exact analytical solution based on Lambert W function. *Energy Conversion and Management*, *210*, 112716. https://doi.org/10.1016/J.ENCONMAN.2020.112716

Caplan, J. S., Giménez, D., Subroy, V., Heck, R. J., Prior, S. A., Runion, G. B., & Torbert, H. A. (2016). Nitrogen-Mediated Effects of Elevated CO2 on Intra-Aggregate Soil Pore Structure. *Global Change Biology*, *23*(4), 1585–1597. https://doi.org/10.1111/gcb.13496

Carr, M. K. V. (2011). The Water Relations And Irrigation Requirements Of Oil Palm (Elaeis Guineensis): A Review. In *Experimental Agriculture* (Vol. 47, Issue 4, pp. 629–652). https://doi.org/10.1017/S0014479711000494

Carrera-Villacrés, D., Carrera Villacrés, J. L., Braun, T., Zhao, Z., Gómez, J., & Quinteros-Carabalí, J. (2020). Fog Harvesting and IoT based Environment Monitoring System at the Ilalo volcano in Ecuador. *International Journal on*

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Advanced Science, Engineering and Information Technology, *10*(1), 407. https://doi.org/10.18517/ijaseit.10.1.10775

Carter, M. R., & Gregorich, E. G. (2007). *Soil Sampling and Methods of Analysis*. CRC Press.

Chabrillat, S., Cierniewski, J., Gomez, C., & Wesemael, B. Van. (2019). Imaging Spectroscopy for Soil Mapping and Monitoring. *Transactions of the ASABE*, *49*(4), 1175–1180. https://doi.org/10.13031/2013.21717

Chalhoub, M., Bernier, M., Coquet, Y., & Philippe, M. (2017). A Simple Heat and Moisture Transfer Model to Predict Ground Temperature for Shallow Ground Heat Exchangers. *Renewable Energy*, *103*, 295–307. https://doi.org/10.1016/j.renene.2016.11.027

Chen, S., Yang, Z., Liu, X., Sun, J., Xu, C., Xiong, D., Lin, W., Li, Y., Guo, J., & Yang, Y. (2019). Moss Regulates Soil Evaporation Leading to Decoupling of Soil and Near-Surface Air Temperatures. *Journal of Soils and Sediments*, *19*(7), 2903–2912. https://doi.org/10.1007/s11368-019-02297-4

Cheng, Y., Yu, L., Cracknell, A. P., & Gong, P. (2016). Oil palm mapping using Landsat and PALSAR: a case study in Malaysia. *International Journal of Remote Sensing*, *37*(22), 5431–5442. https://doi.org/10.1080/01431161.2016.1241448

Chong, K. L., Kanniah, K. D., Pohl, C., & Tan, K. P. (2017). A Review of Remote Sensing Applications for Oil Palm Studies. *Geo-Spatial Information Science*, *20*(2), 184–200. https://doi.org/10.1080/10095020.2017.1337317

Chukwu, E. D., Udoh, B. T., Afangide, A. I., & Osisi, A. F. (2023). Evaluation of soil quality under oil palm cultivation in a coastal plain sands area of Akwa Ibom State Nigeria. *Soil Security*, *10*, 100087. https://doi.org/10.1016/J.SOISEC.2023.100087

Corley, R. H. V., & Tinker, P. B. (2003). The Oil Palm. In *Oil Crops: Growth, Uses, and Toxicity*. https://doi.org/10.1017/cbo9781316530122.010

Corley, R. H. V., & Tinker, P. B. (2016a). The Oil Palm: Fifth Edition. In *John Wiley & Sons* (Fifth). John Wiley & Sons. https://doi.org/10.1002/9781118953297

Corley, R. H. V., & Tinker, P. B. (2016b). *The Oil Palm: Fifth Edition. In John Wiley & Sons* (John Wiley & Sons, Ed.; Fifth).

de Francesco, M. C., Tozzi, F. P., Buffa, G., Fantinato, E., Innangi, M., & Stanisci, A. (2023). Identifying Critical Thresholds in the Impacts of Invasive Alien Plants and Dune Paths on Native Coastal Dune Vegetation. *Land*, *12*(135), 1–16. https://doi.org/10.3390/land12010135

de Moraes, F. A., Moreira, S. G., Peixoto, D. S., Resende Silva, J. C., Macedo, J. R., Silva, M. M., Silva, B. M., Sanchez, P. A., & Nunes, M. R. (2023). Lime incorporation up to 40 cm deep increases root growth and crop yield in highly

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

weathered tropical soils. *European Journal of Agronomy*, *144*, 126763. https://doi.org/10.1016/J.EJA.2023.126763

Debouk, H., Emeterio, L. S., Marí, T., Canals, R. M., & Sebastià, M. T. (2020). Plant Functional Diversity, Climate and Grazer Type Regulate Soil Activity in Natural Grasslands. *Agronomy*, *10*(1291), 1–20. https://doi.org/10.3390/agronomy10091291

Degens, B. P., Krassoi, R., Galvin, L., Reynolds, B., & Micevska, T. (2018). Net acidity indicates the whole effluent toxicity of pH and dissolved metals in metalliferous saline waters. *Chemosphere*, *198*, 492–500. https://doi.org/10.1016/j.chemosphere.2018.01.129

Delima, Akbar, H., & Rafli, M. (2017). *Tingkat Laju Infiltrasi Tanah pada DAS Krueng Mane Kabupaten Aceh Utara*.

Dhaliwal, S. S., Sharma, V., Shukla, A. K., Verma, V., Kaur, M., Singh, P., Gaber, A., & Hossain, A. (2023). Effect of addition of organic manures on basmati yield, nutrient content and soil fertility status in north-western India. *Heliyon*, *9*(3), e14514. https://doi.org/10.1016/J.HELIYON.2023.E14514

Diatta, S. B. D., Tall, L. N., Ndour, Y. B., Sembene, M., & Assigbetsé, K. (2020). Composition and Diversity of Soil Bacterial Communities along an Environmental Gradient in the Sudano-Sahelian Region of Senegal. *Open Journal of Soil Science*, *10*(02), 58–89. https://doi.org/10.4236/ojss.2020.102004

Dien, M. E. (2021). Aplikasi Sistem Precision Agriculture dengan Menggunakan Teknologi Google Earth Api dan Database Oracle. *Jurnal Elko*, *2*(1), 58–70. www.gis.com

Djufry, F., Handoko, & Koesmaryono, Y. (2000). Model Fenologi Tanaman Kelapa Sawit. *J. Agromet*, *15*(1–2), 33–42.

Dong, X., Zhang, Z., Wang, S., Shen, Z., Cheng, X., Lv, X., & Pu, X. (2022). Soil Properties, Root Morphology and Physiological Responses to Cotton Stalk Biochar Addition in Two Continuous Cropping Cotton Field Soils from Xinjiang, China. *PeerJ*, *10*. https://doi.org/10.7717/peerj.12928

Donough, C. R. (2009). Yield Intensification in Oil Palm Plantations through Best Management Practice. *Better Crops*, *93*(1), 12–14. https://www.researchgate.net/publication/237351969

Donough, C. R., Donough, C. R., Witt, C., & Fairhurst, T. H. (2010). *Yield Intensification in Oil Palm using BMP as a Management Tool.* https://www.researchgate.net/publication/267993705

Dunkerley, D. (2021). Rainfall drop arrival rate at the ground: A potentially informative parameter in the experimental study of infiltration, soil erosion, and related land surface processes. *CATENA*, *206*, 105552. https://doi.org/10.1016/J.CATENA.2021.105552

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Edwin, M., Suptrapti, H., Sulistyorini, I. S., & Aliri, A. (2023). Potensi Dan Status Kerusakan Tanah Untuk Produksi Biomassa Di Kabupaten Kutai Timur (Studi Kasus Kecamatan Long Masangat, Batu Ampar dan Rantau Pulung). *Jurnal Tanah Dan Sumberdaya Lahan*, *10*(1), 1–13. https://doi.org/10.21776/ub.jtsl.2023.010.1.1

European Union and FAO. (2023). *Soil Atlas of Asia*. https://doi.org/10.2760/044457

Evizal, R., Wibowo, L., Novpriasyah, H., Yunika Sari, R., & Erry Prasmatiwi, F. (2020). Keragaan Agronomi Tanaman Kelapa Sawit pada Cekaman Kering Periodik Agronomy Performance of Palm Oil Under Periodic Dry Stress. *Journal of Tropical Upland Resources ISSN*, *02*(01), 60–68.

Fairhurst, .H., & Härdter, R. (2003). Oil Palm: Management for Large and Sustainable Yields. In Potash & Phosphate Institute/Potash & Phosphate Institute of Canada : International Potash Institute. *Potash & Phosphate Institute/Potash & Phosphate Institute of Canada : International Potash Institute.*

Fairhurst, T. H., & Mutert, E. (1999). Interpretation and Management of Oil Palm Leaf Analysis Data. *Better Crops International*, *13*(1), 1–4.

Fan, Y., Roupsard, O., Bernoux, M., Le Maire, G., Panferov, O., Kotowska, M. M., & Knohl, A. (2015). A Sub-Canopy Structure for Simulating Oil Palm in The Community Land Model (CLM-Palm): Phenology, Allocation and Yield. *Geoscientific Model Development*, *8*(11), 3785–3800. https://doi.org/10.5194/gmd-8-3785-2015

Fiantis, D. (2018). *Morfologi dan Klasifikasi Tanah*. Lembaga Pengembangan Teknologi Informasi dan Komunikasi, Universitas Andalas.

Filho, A. C. A. C., Penn, C. J., Crusciol, C. A. C., & Calonego, J. C. (2017). Lime and Phosphogypsum Impacts on Soil Organic Matter Pools in A Tropical Oxisol Under Long-Term No-Till Conditions. *Agriculture, Ecosystems &amp Environment*, *241*, 11–23. https://doi.org/10.1016/j.agee.2017.02.027

Filho, W. R. L. L., Rodrigues, F. H. S., Ferreira, I. V. L., Correa, L. O., Cunha, R. L., & Pinheiro, H. A. (2021). Physiological responses of young oil palm (Elaeis guineensis Jacq.) plants to repetitive water deficit events. *Industrial Crops and Products*, *172*, 114052. https://doi.org/10.1016/J.INDCROP.2021.114052

Fitrianto, A. C., Tokimatsu, K., & Sufwandika, M. (2017). Estimation the Amount of Oil Palm Trees Production Using Remote Sensing Technique. *IOP Conference Series: Earth and Environmental Science*, *98*(1), 1–7. https://doi.org/10.1088/1755-1315/98/1/012016

Frey, R. (2013). *Budidaya Kelapa Sawit Ramah Lingkungan Untuk Petani Kecil*. Cordaid dan Biodiversity Agriculture Commodities Program (BACP) of International Finance Coorporation.

Freyer, B., Ellssel, P., Friedel, J. K., & Möller, K. (2023). The contribution of organic farming systems to soil fertility—A systems perspective. *Reference Module in*

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
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Earth Systems and Environmental Sciences, 135–145. https://doi.org/10.1016/B978-0-12-822974-3.00240-8

Fries, A., Silva, K., Pucha-Cofrep, F., Oñate-Valdivieso, F., & Ochoa-Cueva, P. (2020). Water Balance and Soil Moisture Deficit of Different Vegetation Units under Semiarid Conditions in the Andes of Southern Ecuador. *Climate*, *8*(2), 30. https://doi.org/10.3390/cli8020030

Fuady, Z., Satriawan, H., & Agusni. (2019). Effects of Combination of Inorganic and Organic Fertilizers Application on Morphology and Physiology of Immature Oil Palm. *Planta Tropika: Journal of Agro Science*, *7*(1), 73–81. https://doi.org/10.18196/pt.2019.096.73-81

Fujii, K., Shibata, M., Kitajima, K., Ichie, T., Kitayama, K., & Turner, B. L. (2018). Plant–soil Interactions Maintain Biodiversity and Functions of Tropical Forest Ecosystems. *Ecological Research*, *33*(1), 149–160. https://doi.org/10.1007/s11284-017-1511-y

García, L., Parra, L., Jimenez, J. M., Lloret, J., & Lorenz, P. (2020). IoT-Based Smart Irrigation Systems: An Overview on the Recent Trends on Sensors and IoT Systems for Irrigation in Precision Agriculture. *Sensors*, *20*(4), 1042. https://doi.org/10.3390/s20041042

Ghassemi-Golezani, K., & Farhangi-Abriz, S. (2022). Improving plant available water holding capacity of soil by solid and chemically modified biochars. *Rhizosphere*, *21*, 100469. https://doi.org/10.1016/J.RHISPH.2021.100469

Ginting, E. N., & Wiratmoko, D. (2021). Potensi dan Tantangan Penerapan Precision Farming dalam Upaya Membangun Perkebunan Kelapa Sawit yang Berkelanjutan. *Warta PPKS*, *26*(2), 55–66.

Goh, K. J. (2004). *Fertilizer Recommendation Systems for Oil Palm: Estimating the Fertilizer Rates*. https://www.researchgate.net/publication/228663105

Grierson, P. F., Comerford, N. B., & Jokela, E. J. (1999). Phosphorus mineralization and microbial biomass in a Florida Spodosol: effects of water potential, temperature and fertilizer application. *Biology and Fertility of Soils*, *28*(3), 244–252. https://doi.org/10.1007/s003740050489

Gunawan, E., & Pasaribu, S. (2020). Persepsi Petani dalam Implementasi Program Kartu Tani untuk Mendukung Distribusi Pupuk Bersubsidi. *Jurnal Ekonomi Dan Pembangunan*, *28*(2), 131–144.

Gunawan, S., Budiastuti, M. T. S., Sutrisno, J., & Wirianata, H. (2020). Effects of Organic Materials and Rainfall Intensity on the Productivity of Oil Palm Grown under Sandy Soil Condition. *International Journal on Advanced Science, Engineering and Information Technology*, *10*(1), 356. https://doi.org/10.18517/ijaseit.10.1.11001

Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

H, J. L. C., Nicolodelli, G., Senesi, G. S., Montes, C. R., Perruci, N. A. F., Bezzon, V. D. N., Balogh, D. T., & Milori, D. M. B. P. (2020). Organo-Mineral Associations in A Spodosol from Northern Brazil. *Geoderma Regional*, *22*, e00303. https://doi.org/10.1016/j.geodrs.2020.e00303

Haghighi, E., & Or, D. (2015). Turbulence-induced Thermal Signatures Over Evaporating Bare Soil Surfaces. *Geophysical Research Letters*, *42*(13), 5325–5336. https://doi.org/10.1002/2015gl064354

Haiyan, D. A. I., & Haimei, W. A. N. G. (2021). Influence of Rainfall Events on Soil Moisture in a Typical Steppe of Xilingol. *Physics and Chemistry of the Earth, Parts A/B/C*, *121*, 102964. https://doi.org/10.1016/j.pce.2020.102964

Hakim, M. (2013). Kelapa Sawit Teknis Agronomis & Managemen, Tinjauan Praktis dan Teoritis. *Media Perkebunan*.

Harimurti, D., Hariyadi, H., & Noor, E. (2021). Pengurangan Emisi Gas Rumah Kaca pada Perkebunan Kelapa Sawit dengan Pendekatan Life Cycle Assessment. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan*, *11*(1), 1–9. https://doi.org/10.29244/jpsl.11.1.1-9

Hartati, W., Arifin, J., Sudarmadji, T., & Daddy, S. (2021). *Spodosols of East Kalimantan : Land Cover Disturbances Induced Degradation of Soil Properties*. *11*, 403–409.

Hartati, W., Arifin, J., Sudarmadji, T., & Ruhiyat, D. (2021). Spodosols of East Kalimantan: Land Cover Disturbances Induced Degradation of Soil Properties. *Proceedings of the Joint Symposium on Tropical Studies (JSTS-19)*, 403–409.

Haryati, U. (2014). Karakteristik Fisik Tanah Kawasan Budidaya Sayuran Dataran Tinggi, Hubungannya dengan Strategi Pengelolaan Lahan. *Jurnal Sumberdaya Lahan*, *8*(2), 125–138.

Hashim, Z., Muhamad, H., & Subramaniam, V. (2014). Water footprint : part 2 - FFB Production for Oil Palm Planted in Malaysia. *Journal of Oil Palm Research*, *26*(4), 282–291.

Hasibuan, A. S. Z. (2015). Pemanfaatan Bahan Organik dalam Perbaikan Beberapa Sifat Tanah Pasir Pantai Selatan Kulon Progo. *Planta Tropika: Journal of Agro Science*, *3*(1), 31–40. https://doi.org/10.18196/pt.2015.037.31-40

Hatfield, J. L., & Dold, C. (2019). Water-Use Efficiency: Advances and Challenges in a Changing Climate. *Frontiers in Plant Science*, *10*. https://doi.org/10.3389/fpls.2019.00103

Heizer, J., & Render, B. (2015). *Manajemen Operasi*. Salemba Empat.

Hermantoro, H. (2009). Pemodelan dan Simulasi Produktivitas Perkebunan Kelapa Sawit Berdasarkan Kualitas Lahan dan Iklim Menggunakan Jaringan Syaraf Tiruan. *Agromet*, *23*(1), 45. https://doi.org/10.29244/j.agromet.23.1.45-51

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Hesterberg, D., Chou, J. W., Hutchison, K. J., & Sayers, D. E. (2001). Bonding of Hg (II) to Reduced Organic Sulfur in Humic Acid As Affected by S/Hg Ratio. *Environmental Science &amp Technology*, *35*(13), 2741–2745. https://doi.org/10.1021/es001960o

Hidayat, A., Badaruddin, & Yamani, A. (2019). Analisis Laju Dan Besarnya Volume Infiltrasi Pada Berbagai Tutupan Lahan Di Daerah Aliran Sungai (Das) Maluku. *Jurnal Sylva Scienteae*, *02*(5), 785–791.

Hidayat, T. C., Harahap, I. Y., Pangaribuan, Y., Rahutomo, S., Fauzi, W. R., & Harsanto, W. A. (2013). Bunga, Buah, dan Produksi Kelapa Sawit. In W. R. Fauzi & S. Fadhillah (Eds.), *Pusat Penelitian Kelapa Sawit* (Seri Kelap).

Hidayat, T. C., Harahap, I. Y., Pangaribuan, Y., Rahutomo, S., Harsanto, W. A., & Fauzi, W. R. (2013). *Air & Kelapa Sawit* (Seri Kelapa Sawit). Pusat Penelitian Kelapa Sawit.

Hoffmann, M. P., Castaneda Vera, A., van Wijk, M. T., Giller, K. E., Oberthür, T., Donough, C., & Whitbread, A. M. (2014). Simulating potential growth and yield of oil palm (Elaeis guineensis) with PALMSIM: Model description, evaluation and application. *Agricultural Systems*, *131*, 1–10. https://doi.org/10.1016/J.AGSY.2014.07.006

Hong, S., Piao, S., Chen, A., Liu, Y., Liu, L., Peng, S., Sardans, J., Sun, Y., Peñuelas, J., & Zeng, H. (2018). Afforestation Neutralizes Soil pH. *Nature Communications*, *9*(1). https://doi.org/10.1038/s41467-018-02970-1

Hormaza, P., Fuquen, E. M., & Romero, H. M. (2012). Phenology of the Oil Palm Interspecific Hybrid Elaeis oleifera Elaeis guineensis. *Scientia Agricola*, *69*(4), 275–280. https://doi.org/10.1590/s0103-90162012000400007

Hu, G., Zhao, L., Wu, X., Li, R., Wu, T., Xie, C., Qiao, Y., Shi, J., & Cheng, G. (2015). An Analytical Model for Estimating Soil Temperature Profiles on the Qinghai-Tibet Plateau of China. *Journal of Arid Land*, *8*(2), 232–240. https://doi.org/10.1007/s40333-015-0058-4

Huang, R., Huang, J., Zhang, C., Ma, H., Zhuo, W., Chen, Y., Zhu, D., Wu, Q., & Mansary, L. R. (2020). Soil Temperature Estimation at Different Depths, Using Remotely-Sensed Data. *Journal of Integrative Agriculture*, *19*(1), 277–290. https://doi.org/10.1016/s2095-3119(19)62657-2

Ibrahim, M., Li, G., & Tang, Y.-T. (2021). Biochar Effects Acidic Soil Remediation and Brassica oleracea L. Toxicitya Case Study in Subtropical Area of China. *Environmental Technology &amp Innovation*, *23*, 101588. https://doi.org/10.1016/j.eti.2021.101588

Intara, Y. I., Nusantara, A. D., Supanjani, Caniago, Z., & Ekawita, R. (2018). Oil Palm Roots Architecture in Response to Soil Humidity. *International Journal of Oil Palm*, *1*(2), 79–89.

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Ipir, H. V., Astuti, Y. Th. M., & Santosa, T. N. B. (2017). Pengaruh Topografi terhadap Sex Ratio dan Fruit Set pada Kelapa Sawit. *Jurnal Agromast*, *2*(2).

Irl, S. D. H., Harter, D. E. V., Steinbauer, M. J., Gallego Puyol, D., Fernández-Palacios, J. M., Jentsch, A., & Beierkuhnlein, C. (2015). Climate Vs. Topography - Spatial Patterns of Plant Species Diversity And Endemism on A High-Elevation Island. *Journal of Ecology*, *103*(6), 1621–1633. https://doi.org/10.1111/1365-2745.12463

Izzati, M. (2014). Perbedaan Kandungan Bahan Organik pada Tahah Pasir dan Tanah Liat Setelah Penambahan Pembenah Tanah dari Bahan Dasar Tumbuhan Akuatik. *Buletin Anatomi Dan Fisiologi*, *23*, 1–6.

Javed, A., Ali, E., Binte Afzal, K., Osman, A., & Riaz, Dr. S. (2022). Soil Fertility: Factors Affecting Soil Fertility, and Biodiversity Responsible for Soil Fertility. *International Journal of Plant, Animal and Environmental Sciences*, *12*(01). https://doi.org/10.26502/ijpaes.202129

Jayalath, N., Mosley, L. M., Fitzpatrick, R. W., & Marschner, P. (2016). Addition of Organic Matter Influences pH Changes in Reduced and Oxidised Acid Sulfate Soils. *Geoderma*, *262*, 125–132. https://doi.org/10.1016/j.geoderma.2015.08.012

Jelsma, I., Woittiez, L. S., Ollivier, J., & Dharmawan, A. H. (2019). Do wealthy farmers implement better agricultural practices? An assessment of implementation of Good Agricultural Practices among different types of independent oil palm smallholders in Riau, Indonesia. *Agricultural Systems*, *170*, 63–76. https://doi.org/10.1016/J.AGSY.2018.11.004

Juarti. (2016). Analisis Indeks Kualitas Tanah Andisol pada Berbagai Penggunaan Lahan di Desa Sumber Brantas Kota Batu. *Jurnal Pendidikan Geografi*, *21*(2), 58–71. http://journal.um.ac.id/index.php/pendidikan-

Junior, A. J. de S., Camêlo, D. de L., Arruda, D. L. de, Souza Junior, V. S. de, Rocha, A. T. da, & Corrêa, M. M. (2023). Spodosol formation on sandy ruins in a semi-arid climate in the Catimbau National Park, Northeast Brazil. *CATENA*, *229*, 107226. https://doi.org/10.1016/J.CATENA.2023.107226

Jusop, S. (2022). MG-Rich Synthetic Gypsum or Basalt as an Alternative Source of Ameliorant to Manage Soil Acidity for Plantation Tree Crops. *The Planter*, *98*(1152). https://doi.org/10.56333/tp.2022.004

Kader, M. A., Nakamura, K., Senge, M., Mojid, M. A., & Kawashima, S. (2020). Effects of Coloured Plastic Mulch on Soil Hydrothermal Characteristics, Growth and Water Productivity of Rainfed Soybean. *Irrigation and Drainage*, *69*(3), 483–494. https://doi.org/10.1002/ird.2431

Kamai, T., & Assouline, S. (2018). Evaporation From Deep Aquifers in Arid Regions: Analytical Model for Combined Liquid and Vapor Water Fluxes. *Water Resources Research*, *54*(7), 4805–4822. https://doi.org/10.1029/2018wr023030

UNIVERSITAS
GADJAH MADA
**Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Kamalrudin, M. S., & Abudallah, R. (2014). Malaysian Palm Oil - Moving Ahead to Sustainable Production Growth. *Oil Palm Industry Economic Journal*, *14*(1), 24–33.

Kane, D. A., Bradford, M. A., Fuller, E., Oldfield, E. E., & Wood, S. A. (2021). Soil Organic Matter Protects US Maize Yields and Lowers Crop Insurance Payouts Under Drought. *Environmental Research Letters*, *16*(4), 44018. https://doi.org/10.1088/1748-9326/abe492

Kasno, A., & Subardja, D. (2008). Tanah Kesuburan dan Gizi Manajemen pada Spodosol. *Indonesia Soil Research Institute*, 1–8.

Kasno, A., & Subardja, D. (2010). Soil fertility and Nutrient Management on Spodosol for Oil palm. *Agrivita*, *32*(98), 287–294.

Kassaye, K. T., Boulange, J., Lam, V. T., Saito, H., & Watanabe, H. (2020). Monitoring soil water content for decision supporting in agricultural water management based on critical threshold values adopted for Andosol in the temperate monsoon climate. *Agricultural Water Management*, *229*, 105930. https://doi.org/10.1016/j.agwat.2019.105930

Khair, U., Fahmi, H., Hakim, S. Al, & Rahim, R. (2017). Forecasting Error Calculation with Mean Absolute Deviation and Mean Absolute Percentage Error. *Journal of Physics: Conference Series*, *930*(1). https://doi.org/10.1088/1742-6596/930/1/012002

Khamis, A., Ismail, Z., Haron, K., & Mohammed, A. T. (2005). Nonlinear Growth Models for Modeling Oil Palm Yield Growth. *Journal of Mathematics and Statistics*, *1*(3), 225–233.

Kidron, G. J., & Kronenfeld, R. (2015). Temperature Rise Severely Affects Pan and Soil Evaporation in the Negev Desert. *Ecohydrology*, *9*(6), 1130–1138. https://doi.org/10.1002/eco.1701

Kim, S., & Kim, H. (2016). A new metric of absolute percentage error for intermittent demand forecasts. *International Journal of Forecasting*, *32*(3), 669–679. https://doi.org/10.1016/J.IJFORECAST.2015.12.003

Kiswanto, Purwanta, J. H., & Wijayanto, B. (2008). *Teknologi Budidaya Kelapa Sawit*. Balai Pengkajian Teknologi Pertanian.

Kitaya, Y. (2016). Air Current Around Single Leaves and Plant Canopies and Its Effect on Transpiration, Photosynthesis, and Plant Organ Temperatures. In *LED Lighting for Urban Agriculture* (pp. 177–187). Springer Singapore. https://doi.org/10.1007/978-981-10-1848-0_13

Koedadiri, A. D., Adiwiganda, R., & Poeloengan, Z. (1995a). Keragaan Tanaman Kelapa Sawit (Elaeis guinensis Jacq) pada Tanah Typic Paleudults, Psamentic Paleudults, dan Haplorthods. *Prosiding Seminar Nasional HITI. Kongres HITI VII, Serpong*.

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Koedadiri, A. D., Adiwiganda, R., & Poeloengan, Z. (1995b). Keragaan Tanaman Kelapa Sawit (Elaeis guinensis Jacq) pada Tanah Typic Paleudults, Psamentic Paleudults, dan Haplorthods. *Prosiding Seminar Nasional HITI. Kongres HITI VII, Serpong, Bogor*.

Kome, G. K., Enang, R. K., Tabi, F. O., & Yerima, B. P. K. (2019). Influence of Clay Minerals on Some Soil Fertility Attributes: A Review. *Open Journal of Soil Science*, *09*, 155–188. https://doi.org/10.4236/ojss.2019.99010

Kosower, E. M., & Borz, G. (2015). the polyethylene – water interface †. *Physical Chemistry Chemical Physics*, *17*, 24895–24900. https://doi.org/10.1039/C5CP04439A

Kumar, U., Saqib, H. S. A., Islam, W., Prashant, P., Patel, N., Chen, W., Yang, F., You, M., & He, W. (2022). Landscape Composition and Soil Physical–Chemical Properties Drive the Assemblages of Bacteria and Fungi in Conventional Vegetable Fields. *Microorganisms*, *10*(1202), 1–18. https://doi.org/10.3390/microorganisms10061202

Kushardono, D., Pemanfaatan, P., Jauh, P., Penerbangan, L., Nasional, A., Kalisari, J., No, L., & Rebo, P. (2016). Klasifikasi Penutup / Penggunaan Lahan dengan Data Satelit Penginderaan Jauh Hiperspektral (Hyperion) menggunakan Metode Neural Network Tiruan. *Jurnal Penginderaan Jauh*, *13*(2), 85–96.

Lappalainen, K., Piliougine, M., & Spagnuolo, G. (2022). Experimental comparison between various fitting approaches based on RMSE minimization for photovoltaic module parametric identification. *Energy Conversion and Management*, *258*, 115526. https://doi.org/10.1016/J.ENCONMAN.2022.115526

Lauer, A., Lopez, J. J., Chabolla, M., & Kloock, C. (2023). Risk of Exposure to Coccidioides spp. in the Temblor Special Recreation Management Area (SRMA), Kern County, CA. *Microorganisms*, *11*(2), 518. https://doi.org/10.3390/microorganisms11020518

Legros, S., Mialet-Serra, I., Caliman, J. P., Siregar, F. A., Clement-Vidal, A., Fabre, D., & Dingkuhn, M. (2009). Phenology, Growth and Physiological Adjustments of Oil Palm (Elaeis Guineensis) to Sink Limitation Induced by Fruit Pruning. *Annals of Botany*, *104*(6), 1183–1194. https://doi.org/10.1093/aob/mcp216

Leslie, D. M., Gangaiya, P., & Morrison, R. J. (2015a). Two Lowland Tropical Spodosols from the Fiji Islands: First Report from Small Islands. *Pacific Science*, *69*(3), 399–409. https://doi.org/10.2984/69.3.8

Leslie, D. M., Gangaiya, P., & Morrison, R. J. (2015b). Two Lowland Tropical Spodosols from the Fiji Islands: First Report from Small Islands. *Pacific Science*, *69*(3), 399–409. https://doi.org/10.2984/69.3.8

UNIVERSITAS GADJAH MADA
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Li, G., Zhao, H., Feng, F., Wu, Q., & Wei, B. (2022). Measurement and Analysis of Soil Temperature Field Based on Fiber Bragg Grating Sensor Array. *IEEE Access*, *10*, 124705–124714. https://doi.org/10.1109/access.2022.3225199

Li, M., Wu, P., Ma, Z., Pan, Z., Lv, M., Yang, Q., & Duan, Y. (2022). The Increasing Role of Vegetation Transpiration in Soil Moisture Loss across China under Global Warming. *Journal of Hydrometeorology*, *23*(2), 253–274. https://doi.org/10.1175/jhm-d-21-0132.1

Li, X., Dang, X., Gao, Y., Meng, Z., Chen, X., & Wang, Y. (2022). Response Mechanisms of Adventitious Root Architectural Characteristics of Nitraria tangutorum Shrubs to Soil Nutrients in Nabkha. *Plants*, *11*(23), 1–17. https://doi.org/10.3390/plants11233218

Libohova, Z., Seybold, C., Wysocki, D., Wills, S., Schoeneberger, P., Williams, C., Lindbo, D., Stott, D., & Owens, P. R. (2018). Reevaluating the Effects of Soil Organic Matter and Other Properties on Available Water-Holding Capacity using the National Cooperative Soil Survey Characterization Database. *Journal of Soil and Water Conservation*, *73*(4), 411–421. https://doi.org/10.2489/jswc.73.4.411

Lim, Y. L., Tenorio, F. A., Monzon, J. P., Sugianto, H., Donough, C. R., Rahutomo, S., Agus, F., Slingerland, M. A., Darlan, N. H., Dwiyahreni, A. A., Farrasati, R., Mahmudah, N., Muhamad, T., Nurdwiansyah, D., Palupi, S., Pradiko, I., Saleh, S., Syarovy, M., Wiratmoko, D., & Grassini, P. (2023). Too little, too imbalanced: Nutrient supply in smallholder oil palm fields in Indonesia. *Agricultural Systems*, *210*, 103729. https://doi.org/10.1016/J.AGSY.2023.103729

Lim, Y. L., Wandri, R., Gerendas, J., Sugianto, H., Donough, C., & Oberthür, T. (2018). Update on oil palm nutrient budget. *6th Quadrennial International Oil Palm Conference, 17–19 July 2018*, 1–5.

Liu, J., & Pu, Z. (2019). Does Soil Moisture Have an Influence on Near-Surface Temperature? *Journal of Geophysical Research: Atmospheres*, *124*(12), 6444–6466. https://doi.org/10.1029/2018jd029750

Liu, T., Ramirez-Marquez, J. E., Jagupilla, S. C., & Prigiobbe, V. (2021). Combining a statistical model with machine learning to predict groundwater flooding (or infiltration) into sewer networks. *Journal of Hydrology*, *603*, 126916. https://doi.org/10.1016/J.JHYDROL.2021.126916

Lubis, A. U. (2008). *Kelapa Sawit (elaeis guineensis jacq.) di Indonesia* (Edisi 2). Pusat Penelitian Kelapa Sawit.

Lynch, J. P., Strock, C. F., Schneider, H. M., Sidhu, J. S., Ajmera, I., Galindo-Castañeda, T., Klein, S. P., & Hanlon, M. T. (2021). Root Anatomy and Soil Resource Capture. In *Plant and Soil* (Vol. 466, Issues 1–2, pp. 21–63). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/s11104-021-05010-y

Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air
dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Ma, S. C., Duan, A. W., Wang, R., Guan, Z. M., Yang, S. J., Ma, S. T., & Shao, Y. (2015). Root-sourced signal and photosynthetic traits, dry matter accumulation and remobilization, and yield stability in winter wheat as affected by regulated deficit irrigation. *Agricultural Water Management*, *148*, 123–129. https://doi.org/10.1016/J.AGWAT.2014.09.028

Magliano, P. N., Giménez, R., Houspanossian, J., Páez, R. A., Nosetto, M. D., Fernández, R. J., & Jobbágy, E. G. (2017). Litter is More Effective Than Forest Canopy Reducing Soil Evaporation in Dry Chaco Rangelands. *Ecohydrology*, *10*(7). https://doi.org/10.1002/eco.1879

Manfarizah, M., Syamaun, S., & Nurhaliza, S. (2011). Karakteristik Sifat Kimia Tanah Di University Farm Stasiun Bener Meriah. In *Jurnal Agrista* (Vol. 15, Issue 1, pp. 1–9).

Mangoensoekarjo, S. (2007). *Manajemen Tanah dan Pemupukan Budidaya Perkebunan*. Gadjah Mada University Press.

Manguoensoekarjo, S., & Semangun, H. (2008). Manajemen Agribisnis Kelapa Sawit. In *Gajah Mada University Press*. Gajah Mada University Press.

Maricar, M. A. (2019). Analisa Perbandingan Nilai Akurasi Moving Average dan Exponential Smoothing untuk Sistem Peramalan Pendapatan pada Perusahaan XYZ. *Jurnal Sistem Dan Informatika*, *13*(2), 1–10.

Martinsen, V., Alling, V., Nurida, N. L., Mulder, J., Hale, S. E., Ritz, C., Rutherford, D. W., Heikens, A., Breedveld, G. D., & Cornelissen, G. (2015). pH Effects of the Addition of three Biochars to Acidic Indonesian Mineral Soils. *Soil Science and Plant Nutrition*, *61*(5), 821–834. https://doi.org/10.1080/00380768.2015.1052985

Matsumoto, S., Ogata, S., Shimada, H., Sasaoka, T., Hamanaka, A., & Kusuma, G. (2018). Effects of pH-Induced Changes in Soil Physical Characteristics on the Development of Soil Water Erosion. *Geosciences*, *8*(4), 134. https://doi.org/10.3390/geosciences8040134

Mayakaduwage, S., Mosley, L. M., & Marschner, P. (2021). Phosphorus Pools in Acid Sulfate Soil Are Influenced by pH, Water Content, and Addition of Organic Matter. *Journal of Soil Science and Plant Nutrition*, *21*(2), 1066–1075. https://doi.org/10.1007/s42729-021-00422-2

Meng, F., Zhang, T., & Yin, D. (2023). The Effects of Soil Drought Stress on Growth Characteristics, Root System, and Tissue Anatomy of Pinus sylvestris var. Mongolica. *PeerJ*, *11*. https://doi.org/10.7717/peerj.14578

Michael, P. S., Fitzpatrick, R. W., & Reid, R. J. (2015). The Importance of Soil Carbon and Nitrogen for Amelioration of Acid Sulphate Soils. *Soil Use and Management*, *32*(1), 97–105. https://doi.org/10.1111/sum.12239

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Miettinen, J., Gaveau, D. L. A., & Liew, S. C. (2019). Comparison of Visual and Automated Oil Palm Mapping in Borneo. *International Journal of Remote Sensing*, *40*(21), 8174–8185. https://doi.org/10.1080/01431161.2018.1479799

Milazzo, F., Francksen, R. M., Zavattaro, L., Abdalla, M., Hejduk, S., Enri, S. R., Pittarello, M., Price, P. N., Schils, R. L. M., Smith, P., & Vanwalleghem, T. (2023). The role of grassland for erosion and flood mitigation in Europe: A meta-analysis. *Agriculture, Ecosystems & Environment*, *348*, 108443. https://doi.org/10.1016/J.AGEE.2023.108443

Momii, K., Hiyama, H., & Takeuchi, S. (2021). Field Sugarcane Transpiration Based on Sap Flow Measurements and Root Water Uptake Simulations: Case Study on Tanegashima Island, Japan. *Agricultural Water Management*, *250*, 106836. https://doi.org/10.1016/j.agwat.2021.106836

Mondal, S., & Chakraborty, D. (2023). Root growth and physiological responses in wheat to topsoil and subsoil compaction with or without artificial vertical macropores. *Heliyon*, *9*(8), e18834. https://doi.org/10.1016/J.HELIYON.2023.E18834

Montagna, M., Brunetti, M., Spada, A., Cussigh, A., Alali, S., Cremonesi, P., Pizzi, F., Magoga, G., & Marino Gallina, P. (2022). Factors Affecting Soil Invertebrate Biodiversity In Agroecosystems of the Po Plain Area (Italy). *ARPHA Conference Abstracts*, *5*. https://doi.org/10.3897/aca.5.e95808

Monzon, J. P., Lim, Y. L., Tenorio, F. A., Farrasati, R., Pradiko, I., Sugianto, H., Donough, C. R., Rattalino Edreira, J. I., Rahutomo, S., Agus, F., Slingerland, M. A., Zijlstra, M., Saleh, S., Nashr, F., Nurdwiansyah, D., Ulfaria, N., Winarni, N. L., Zulhakim, N., & Grassini, P. (2023). Agronomy explains large yield gaps in smallholder oil palm fields. *Agricultural Systems*, *210*, 103689. https://doi.org/10.1016/J.AGSY.2023.103689

Mookma, D. I., & Buurman, P. (1982). Podzols and Podzolization In Temperate Regions. ISM Monograph 1. *Int. Soil Museum, Wageningan*.

Muhammad, N., Aziz, R., Brookes, P. C., & Xu, J. (2017). Impact of Wheat Straw Biochar on Yield of Rice and Some Properties of Psammaquent and Plinthudult. *Journal of Soil Science and Plant Nutrition*, *17*(3), 808–823. https://doi.org/10.4067/s0718-95162017000300019

Mulyani, A., Rachman, A., & Dairah, A. (2011). Penyebaran Lahan Masam, Potensi dan Ketersediaanya untuk Pengembangan Pertanian. *Prosiding Simposium Nasional Pendayagunaan Tanah Masam*, 73–80.

Murtilaksono, K., Siregar, H. H., & Darmosarkoro, W. (2007). Model Neraca Air di Perkebunan Kelapa Sawit (Water Balance Model in Oil Palm Plantation). *Jumal Penelitian Kelapa Sawit*, *15*(1), 21–35.

UNIVERSITAS
GADJAH MADA
**Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Myttenaere, A. de, Golden, B., Le Grand, B., & Rossi, F. (2016). Mean Absolute Percentage Error for regression models. *Neurocomputing*, *192*, 38–48. https://doi.org/10.1016/J.NEUCOM.2015.12.114

Nababan, A. (2018). *Analisis Faktor Produksi Terhadap Pencapaian Produktivitas Kelapa Sawit Di Kebun Sei Batang Ulak, Pt Ciliandra Perkasa (First Resources) Riau*. Institut Pertanian Bogor.

Naulandari, A. P. (2018). Kesesuaian Lahan Pasca Tambang Timah, Lahan Kelapa Sawit dan Lahan Semak Belukar untuk Tanaman Kelapa Sawit di Desa Sempan Kecamatan Pemali, Bangka. In *Universitas Sriwijaya*.

Nazari, Y. A. (2010). Kajian Status Hara Tanah dan Jaringan Tanaman Kelapa Sawit (Elaeis guineensis jacq) di Kebun Kelapa Sawit BP3T Kecamatan Tambang Ulang Pelaihari Kabupaten Tanah Laut. *Agroscientiae*, *17*(1), 1–7.

Nordiana, A. A., Wahid, O., Esnan, A. G., Zaki, A., Tarmizi, A. M., Zulkifli, H., & Norman, K. (2013). Land Evaluation for Oil Palm Cultivation using Geospatial Information Technologies. *Oil Palm Bulletin 67*, 17–29.

Nurbaity, A., Yuniarti, A., & Sungkono, S. (2017). Peningkatan Kualitas Tanah Bekas Tambang Pasir Melalui Penambahan Amelioran Biologis. *Agrikultura*, *28*(1), 21–26. https://doi.org/10.24198/agrikultura.v28i1.12295

Nurdian, W., Dede, M., Widiawaty, M. A., Ramadhan, Y. R., & Purnama, Y. (2020). Pemanfaatan sensor mikro DHT11-Arduino untuk monitoring suhu dan kelembaban udara. *Seminar Nasional - Pertemuan Ilmiah Tahunan II - Ilmu Lingkungan Tahun 2019*. https://doi.org/https://doi.org/10.31219/osf.io/6skfw

Obour, A. K., Silveira, M. L., Vendramini, J. M. B., Sollenberger, L. E., & O'Connor, G. A. (2011). Fluctuating water table effect on phosphorus release and availability from a Florida Spodosol. *Nutrient Cycling in Agroecosystems*, *91*(2), 207–217. https://doi.org/10.1007/s10705-011-9456-y

Oktari, I., Mustamu, N. E., & Walidav, H. (2021). Ultisols fertility and morphological characteristics of N-fixing bacteria from oil palm rhizosphere. *Pesquisa Agropecuaria Tropical*, *51*. https://doi.org/10.1590/1983-40632021v5168559

Oliveira, A. P. De, Silva, I., & Fontes, M. P. F. (2010). *Spodosols pedogenesis under barriers formation and sandbank environments in the south of Bahia FORMATION AND SANDBANK ENVIRONMENTS IN*. *April 2016*. https://doi.org/10.1590/S0100-06832010000300026

Oliveira, I. V. de, Aguiar, R. O., Lima, C. C., Cunha, R. L., Cruz, W. P. da, Silva, C. R. da, Silva, V. F. A., Silva, J. P. da, Carvalho, F. I. M., Martins, L. H. da S., Silva, P. A., & Pinheiro, H. A. (2020). Diurnal Variations in Water Potential and Gas Exchanges in Two-Hybrid Oil Palms Under Water Deficit. *Journal of Agricultural Science*, *12*(12), 75. https://doi.org/10.5539/jas.v12n12p75

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Onwuka, B. (2018). Effects of Soil Temperature on Some Soil Properties and Plant Growth. *Advances in Plants &amp Agriculture Research*, *8*(1). https://doi.org/10.15406/apar.2018.08.00288

Orgiazzi, A., & Panagos, P. (2018). Soil Biodiversity And Soil Erosion: It Is Time To Get Married: Adding An Earthworm Factor To Soil Erosion Modelling. *Global Ecology and Biogeography*, *27*, 1155–1167. https://doi.org/10.1111/geb.12782

Ott, R. F. (2020). How Lithology Impacts Global Topography, Vegetation, and Animal Biodiversity: A Global-Scale Analysis of Mountainous Regions. *Geophysical Research Letters*, *47*(20), 1–11. https://doi.org/10.3929/ethz-b-000449983

Pahan, I. (2012). *Panduan Lengkap Kelapa Sawit Manajemen Agribisnis dari Hulu Hingga Hilir. In S. Prayugo (Ed.)* (2nd ed.). Penerbit Swadaya.

Paramananthan, S. (2013). Managing Marginal Soils for Sustainable Growth of Oil Palms in the Tropics. *Journal of Oil Palm and the Environment*, *4*(1), 1–16. https://doi.org/10.5366/jope.2013.1

Paul-Limoges, E., Wolf, S., Schneider, F. D., Longo, M., Moorcroft, P., Gharun, M., & Damm, A. (2020). Partitioning Evapotranspiration with Concurrent Eddy Covariance Measurements in A Mixed Forest. *Agricultural and Forest Meteorology*, *280*, 107786. https://doi.org/10.1016/j.agrformet.2019.107786

Pérez-Sato, M., Gómez-Gutiérrez, Á., López-Valdez, F., Ayala-Niño, F., Soni-Guillermo, E., González-Graillet, M., & Pérez-Hernández, H. (2023). Soil physicochemical properties change by age of the oil palm crop. *Heliyon*, *9*(6), e16302. https://doi.org/10.1016/J.HELIYON.2023.E16302

Persoon, G. A., & Simarmata, R. (2014). Undoing 'marginality': The islands of the Mahakam Delta, East Kalimantan (Indonesia). *Journal of Marine and Island Cultures*, *3*(2), 43–53. https://doi.org/10.1016/J.IMIC.2014.11.002

Pham, M. T., Vernieuwe, H., Baets, B. De, Willems, P., & Verhoest, N. E. C. (2015). Stochastic Simulation of Precipitation-Consistent Daily Reference Evapotranspiration Using Vine Copulas. *Stochastic Environmental Research and Risk Assessment*, *30*(8), 2197–2214. https://doi.org/10.1007/s00477-015-1181-7

Piaser, E., & Villa, P. (2023). Evaluating Capabilities Of Machine Learning Algorithms for Aquatic Vegetation Classification in Temperate Wetlands Using Multi-Temporal Sentinel-2 Data. *International Journal of Applied Earth Observation and Geoinformation*, *117*, 1–12. https://doi.org/10.1016/j.jag.2023.103202

Potocka, I., & Szymanowska-Pulka, J. (2018). Morphological Responses of Plant Roots to Mechanical Stress. In *Annals of Botany* (Vol. 122, Issue 5, pp. 711–723). NLM (Medline). https://doi.org/10.1093/aob/mcy010

Pradiko, I., Darlan, N. H., Ginting, E. N., & Syarovy, M. (2022). Teknik Estimasi Transpirasi Tanaman Kelapa Sawit dengan Metode Heat Ratio. *J. Pen. Kelapa Sawit*, *30*(1), 27–36.

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Pradiko, I., Farrasati, R., Rahutomo, S., Ginting, E. N., Candra, D. A. A., Krissetya, Y. A., & Mahendra, Y. S. (2020). Pengaruh Iklim Terhadap Dinamika Kelembaban Tanah di Piringan Pohon Tanaman Kelapa Sawit. *Warta PPKS*, *25*(1), 39–51.

Pradiko, I., Hidayat, F., Darlan, N. H., Santoso, H., Winarna, W., Rahutomo, S., & Sutarta, E. S. (2016). Distribusi Perakaran Kelapa Sawit dan Sifat Fisik Tanah pada Ukuran Lubang Tanam dan Aplikasi Tandan Kosong Sawit yang Berbeda. *Jurnal Penelitian Kelapa Sawit*, *24*(1), 23–38. https://doi.org/10.22302/iopri.jur.jpks.v24i1.4

Praveen, G. V., & Kurre, P. (2021). Influence of coir fiber reinforcement on shear strength parameters of cement modified marginal soil mixed with fly ash. *Materials Today: Proceedings*, *39*, 504–507. https://doi.org/10.1016/J.MATPR.2020.08.238

Prawito, P., Sitorus, I. H. W., Muktamar, Z., Hermawan, B., & Herman, W. (2021). Soil Properties Variability Under Various Agroecosystems In Ultisols Of Bengkulu. *TERRA*, *4*(2), 53–59. https://doi.org/10.31186/terra.4.2.53-59

Primananda, S., & Irfani, N. (2022). *Soil Fertility Assesment of Wilmar International Plantation Central Kalimantan Project Area Final Report 2022*.

Pujawan, M., Afandi, A., Novpriansyah, H., & Manik, K. E. S. (2016). Kemantapan Agregat Tanah pada Lahan Produksi Rendah dan Tinggi di PT Great Giant Pineapple. *Jurnal Agrotek Tropika*, *4*(1). https://doi.org/10.23960/jat.v4i1.1915

Purba, J. R. (2018). *Pertumbuhan dan Produksi Kelapa Sawit (Elaeis guineensis, Jacq) di Dataran Tinggi Studi Kasus Bah Birung Ulu PTPN IV Simalungun*. http://repositori.usu.ac.id/handle/123456789/15668

Querejeta, J. I. (2017). Soil Water Retention and Availability as Influenced by Mycorrhizal Symbiosis. In *Mycorrhizal Mediation of Soil* (pp. 299–317). Elsevier. https://doi.org/10.1016/b978-0-12-804312-7.00017-6

Rajan, J., & Anandhan, S. V. (2016). Influence of nitrogen and potassium on root nutrient and root CEC of different tea cultivars (Camellia sinensis, C. assamica and C. assamica spp. Lasiocalyx). *Rhizosphere*, *1*, 36–44. https://doi.org/10.1016/J.RHISPH.2016.07.004

Ramli, N. E., Yahya, Z. R., & Said, N. A. (2022). Confusion Matrix as Performance Measure for Corner Detectors. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *29*(1), 256–265. https://doi.org/10.37934/araset.29.1.256265

Rao, V., Palat, T., Chayawat, N., & Corley, R. H. V. (2008). The Univanich Oil Palm Breeding Programme and Progeny Trial Results from Thailand. *Planter*, *84*, 519–534.

Rauf, A. (2019). *Peremajaan Sawit Rakyat sebagai Program Strategis BPDPKS*.

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Rawal, A., Chakraborty, S., Li, B., Lewis, K., Godoy, M., Paulette, L., & Weindorf, D. C. (2019). Determination of base saturation percentage in agricultural soils via portable X-ray fluorescence spectrometer. *Geoderma*, *338*, 375–382. https://doi.org/10.1016/J.GEODERMA.2018.12.032

Rendana, M., Rahim, S. A., Idris, W. M. R., Lihan, T., & Rahman, Z. A. (2016). Mapping Nutrient Status in Oil Palm Plantation Using Geographic Information System. *Asian Journal of Agricultural Research*, *10*(3–4), 144–153. https://doi.org/10.3923/ajar.2016.144.153

Rizeei, H. M., Shafri, H. Z. M., Mohamoud, M. A., Pradhan, B., & Kalantar, B. (2018). Oil Palm Counting and Age Estimation from WorldView-3 Imagery and LiDAR Data using an Integrated OBIA Height Model and Regression Analysis. *Journal of Sensors*, *2018*, 1–14. https://doi.org/10.1155/2018/2536327

Romero, H. M., Guataquira, S., & Forero, D. C. (2022). Light Interception, Photosynthetic Performance, and Yield of Oil Palm Interspecific OxG Hybrid (Elaeis oleifera (Kunth) Cortés x Elaeis guineensis Jacq.) under Three Planting Densities. *Plants*, *11*(9), 1–14. https://doi.org/10.3390/plants11091166

Rukshana, F., Butterly, C. R., Baldock, J. A., & Tang, C. (2010). Model Organic Compounds Differ in Their Effects on pH Changes of Two Soils Differing in Initial pH. *Biology and Fertility of Soils*, *47*(1), 51–62. https://doi.org/10.1007/s00374-010-0498-0

Ryan, P. R., Delhaize, E., Watt, M., & Richardson, A. E. (2016). Plant Roots: Understanding Structure and Function in an Ocean of Complexity. *Annals of Botany*, *118*, 555–559. https://doi.org/10.1093/aob/mcw192

Rye, C. F., & Smettem, K. R. J. (2017). The Effect of Water Repellent Soil Surface Layers on Preferential Flow and Bare Soil Evaporation. *Geoderma*, *289*, 142–149. https://doi.org/10.1016/j.geoderma.2016.11.032

Safitri, L., Suryanti, S., Kautsar, V., Kurniawan, A., & Santiabudi, F. (2018). Study of Oil Palm Root Architecture with Variation of Crop Stage and Soil Type Vulnerable to Drought. *IOP Conference Series: Earth and Environmental Science*, *141*(1), 1–8. https://doi.org/10.1088/1755-1315/141/1/012031

Saha, A., Rattan, B., Sekharan, S., & Manna, U. (2020). Quantifying the Interactive Effect of Water Absorbing Polymer (WAP)-Soil Texture on Plant Available Water Content and Irrigation Frequency. *Geoderma*, *368*, 114310. https://doi.org/10.1016/j.geoderma.2020.114310

Salmiyati, heryansyah, A., Idayu, I., & Supriyanto, E. (2014). Oil Palm Plantations Management Effects on Productivity Fresh Fruit Bunch (FFB). *APCBEE Procedia*, *8*, 282–286. https://doi.org/10.1016/j.apcbee.2014.03.041

Santari, P. T., Amin, M., Mulyawan, R., Pengkajian, B., Pertanian, T., Barat, K., Hulu, S., Barat, K., Pengkajian, B., Pertanian, T., Utara, S., Utara, S., Mangkurat, U. L.,

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

& Baru, K. B. (2021). *Perbaikan Sifat Tanah pada Lahan Berpasir Dengan Pemberian Pupuk Kandang dan Pupuk Hayati*. 854–862.

Santoso, A., Rauf, A., & Sabrina, T. (2019). Utilization of Oil Palm Empty Fruit Bunch (EFB) as Spodosol Soil Ameliorant for Increasing Oil Palm Root Growth. *IC2RSE*, 1–6. https://doi.org/DOI 10.4108/eai.4-12-2019.2293827

Santoso, H. (2020). Pengamatan dan Pemetaan Penyakit Busuk Pangkal Batang di Perkebunan Kelapa Sawit Menggunakan Unmanned Aerial Vehicle (UAV) dan Kamera Multispektral. *Jurnal Fitopatologi Indonesia*, *16*(2), 69–80. https://doi.org/10.14692/jfi.16.2.69-80

Santoso, H. S., Sutarta, E. S., & Darmosarkoro, W. (2013). Pengelolaan Tanah dan Penggunaan Pupuk NPK Palmo pada Tanah Spodosols di PT Bumitama Gunajaya Agro. *Pusat Penelitian Kelapa Sawit*.

Santoso, H. S., Syarovy, M., Pradiko, I., & Winarna. (2015). Penggunaan Fly Ash sebagai Alternatif Bahan Amelioran pada Tanah Berpasir (Spodosol) di Perkebunan Kelapa Sawit. *Prosiding PTKS 2015*, 329–336.

Saputro, I. W., & Sari, B. W. (2019). Uji Performa Algoritma Naïve Bayes untuk Prediksi Masa Studi Mahasiswa. *Citec Journal*, *6*(1), 1–11.

Sargent, R. G. (2010). Verification and validation of simulation models. *Proceedings - Winter Simulation Conference*, 166–183. https://doi.org/10.1109/WSC.2010.5679166

Saripudin, E. (2015, June). Fenologi Kemunculan Pelepah dan Bunga dari Dua Genotipe Kelapa Sawit di Sumatera dan Kalimantan. *Prosiding Seminar Nasional Masyarakat Biodiversitas Indonesia*. https://doi.org/10.13057/psnmbi/m010340

Sartohadi, J., Jamulya, & Dewi, N. I. S. (2012). *Pengantar geografi tanah*. Pustaka Pelajar.

Scheffer, F., & Schachtschabel, P. (2002). Lehrbuch der Bodenkunde. In *Spektrum Akademischer Verlag*.

Schmidt, S. B., Brown, L. K., Booth, A., Wishart, J., Hedley, P. E., Martin, P., Husted, S., George, T. S., & Russell, J. (2023). Heritage genetics for adaptation to marginal soils in barley. *Trends in Plant Science*, *28*(5), 544–551. https://doi.org/10.1016/J.TPLANTS.2023.01.008

Schymanski, S. J., & Or, D. (2015). Wind Effects on Leaf Transpiration Challenge the Concept of Potential Evaporation. *Proceedings of the International Association of Hydrological Sciences*, *371*, 99–107. https://doi.org/10.5194/piahs-371-99-2015

Sehler, R., Li, J., Reager, J. T., & Ye, H. (2019). Investigating Relationship Between Soil Moisture and Precipitation Globally Using Remote Sensing Observations. *Journal of Contemporary Water Research &amp Education*, *168*(1), 106–118. https://doi.org/10.1111/j.1936-704x.2019.03324.x

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Sellan, G., Thompson, J., Majalap, N., & Brearley, F. Q. (2019). Soil Characteristics Influence Species Composition and Forest Structure Differentially Among Tree Size Classes in a Bornean Heath Forest. *Plant and Soil*, 1–39. https://doi.org/10.1007/s11104-019-04000-5

Seo, M., Park, D.-H., Lee, C. W., Jaworski, J., & Kim, J.-M. (2016). Fluorometric Measurement of Individual Stomata Activity and Transpiration via a Brush-on, Water-Responsive Polymer. *Scientific Reports*, *6*(1). https://doi.org/10.1038/srep32394

Setyawan, B. (2018). *Kajian Berbagai Tanaman Penutup Tanah Terhadap Sifat Kimia Tanah Pada Inceptisol Dan Spodosol Di Perkebunan Kelapa*. Universitas Brawijaya.

Setyowati, H. A., Murti, S. H. B. S., & Widyatmanti, W. (2016). Yield Estimation Comparison of Oil Palm Based on Plant Density Coefficient Variation Index Using Spot-6 Imagery in Part Of Riau. *IOP Conference Series: Earth and Environmental Science*, *37*(1). https://doi.org/10.1088/1755-1315/37/1/012038

Shabdin, M. K., Shariff, A. R. M., Johari, M. N. A., Saat, N. K., & Abbas, Z. (2016). A study on the Oil Palm Fresh Fruit Bunch (FFB) Ripeness Detection by using Hue, Saturation and Intensity (HSI) Approach. *IOP Conference Series: Earth and Environmental Science*, *37*(1), 1–10. https://doi.org/10.1088/1755-1315/37/1/012039

Shafri, H. Z. M., & Hamdan, N. (2009). Hyperspectral Imagery for Mapping Disease Infection in Oil Palm Plantation Using Vegetation Indices and Red Edge Techniques Helmi Zulhaidi Mohd Shafri and Nasrulhapiza Hamdan Department of Civil Engineering , Faculty of Engineering ,. *American Journal of Applied Sciences*, *6*(6), 1031–1035.

Shang, R., Li, S., Huang, X., Liu, W., Lang, X., & Su, J. (2021). Effects of Soil Properties and Plant Diversity on Soil Microbial Community Composition and Diversity During Secondary Succession. *Forests*, *12*(805), 1–12. https://doi.org/10.3390/f12060805

Shao, W., Coenders-Gerrits, M., Judge, J., Zeng, Y., & Su, Y. (2018). The impact of Non-Isothermal Soil Moisture Transport on Evaporation Fluxes in A Maize Cropland. *Journal of Hydrology*, *561*, 833–847. https://doi.org/10.1016/j.jhydrol.2018.04.033

Shibata, M., Sugihara, S., Mvondo-Ze, A. D., Araki, S., & Funakawa, S. (2017). Nitrogen Flux Patterns Through Oxisols and Ultisols in Tropical Forests of Cameroon, Central Africa. *Soil Science and Plant Nutrition*, *63*(3), 306–317. https://doi.org/10.1080/00380768.2017.1341285

Shlyannikov, V. (2016). Nonlinear Stress Intensity Factors in Fracture Mechanics and Their Applications. *Procedia Structural Integrity*, *2*, 744–752. https://doi.org/10.1016/j.prostr.2016.06.096

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Shoaib, M., Banerjee, B. P., Hayden, M., & Kant, S. (2022). Roots' Drought Adaptive Traits in Crop Improvement. In *Plants* (Vol. 11, Issue 2256, pp. 1–20). MDPI. https://doi.org/10.3390/plants11172256

Šimansky, V., & Bajcan, D. (2014). Stability of Soil Aggregates and Their Ability of Carbon Sequestration. *Soil and Water Research*, *9*(3), 111–118. https://doi.org/10.17221/106/2013-swr

Skrzypek, G., Dogramaci, S., Page, G. F. M., Rouillard, A., & Grierson, P. F. (2019). Unique Stable Isotope Signatures of Large Cyclonic Events as a Tracer of Soil Moisture Dynamics in the Semiarid Subtropics. *Journal of Hydrology*, *578*, 124124. https://doi.org/10.1016/j.jhydrol.2019.124124

Slessarev, E. W., Lin, Y., Bingham, N. L., Johnson, J. E., Dai, Y., Schimel, J. P., & Chadwick, O. A. (2016). Water balance creates a threshold in soil pH at the global scale. *Nature*, *540*(7634), 567–569. https://doi.org/10.1038/nature20139

Soil Survey Staff. (1999). *Kunci Taksonomi Tanah* (2nd ed.). Pusat Penelitian Tanah Dan Agroklimat, Badan Penelitian Dan Pengembangan Pertanian.

Soil Survey Staff. (2010). *Keys to Soil Taxonomy*.

Souza Junior, A. J. de, Camêlo, D. de L., Arruda, D. L. de, Souza Junior, V. S. de, Rocha, A. T. da, & Corrêa, M. M. (2023). Spodosol formation on sandy ruins in a semi-arid climate in the Catimbau National Park, Northeast Brazil. *CATENA*, *229*, 107226. https://doi.org/10.1016/J.CATENA.2023.107226

Spinola, D., Portes, R., Fedenko, J., Lybrand, R., Dere, A., Biles, F., Trainor, T., Bowden, M. E., & D'Amore, D. (2022). Lithological controls on soil geochemistry and clay mineralogy across Spodosols in the coastal temperate rainforest of southeast Alaska. *Geoderma*, *428*, 116211. https://doi.org/10.1016/J.GEODERMA.2022.116211

Stampoulis, D., Damavandi, H. G., Boscovic, D., & Sabo, J. (2021). Using Satellite Remote Sensing and Machine Learning Techniques Towards Precipitation Prediction and Vegetation Classification. *Journal of Environmental Informatics*, *37*(1), 1–15. https://doi.org/10.3808/jei.202000427

Stuurop, J. C., van der Zee, S. E. A. T. M., & French, H. K. (2022). The influence of soil texture and environmental conditions on frozen soil infiltration: A numerical investigation. *Cold Regions Science and Technology*, *194*, 103456. https://doi.org/10.1016/J.COLDREGIONS.2021.103456

Subagyo, H., Suharta, N., & Siswanto, A. B. (2004). *Sumberdaya Lahan Indonesia dan Pengelolaannya* (2nd ed.). Pusat Penelitian Tanah dan Agroklimat.

Subardja, D. S., Ritung, S., Anda, M., Sukarman, Suryani, E., & Subandiono, R. E. (2014). *Petunjuk Teknis Klasifikasi Tanah Nasional* (Hikmatullah, Suparto, C. Tafakresnanto, Suratman, & K. Nugroho, Eds.; 1st ed., Vol. 1). Balai Besar Litbang Sumberdaya Lahan Pertanian. http://bbsdlp.litbang.pertanian.go.id

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
Suwardi, Prof. Dr. Ir. Lilik Soetiarso, M.Eng.; Dr. Ir. Herry Wirianata, MS.; Andri Prima Nugroho, S.T.P., M.Sc., Ph.D.;
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Sugianto, H., Monzon, J. P., Pradiko, I., Tenorio, F. A., Lim, Y. L., Donough, C. R., Sunawan, Rahutomo, S., Agus, F., Cock, J., Amsar, J., Farrasati, R., Iskandar, R., Rattalino Edreira, J. I., Saleh, S., Santoso, H., Tito, A. P., Ulfaria, N., Slingerland, M. A., & Grassini, P. (2023). First things first: Widespread nutrient deficiencies limit yields in smallholder oil palm fields. *Agricultural Systems*, *210*, 103709. https://doi.org/10.1016/J.AGSY.2023.103709

Suharta, N., & Prasetyo, B. H. (2009). Mineralogical and Chemical Characteristic of Spodosols in Toba Highland, North Sumatera. *PPKS*.

Suharta, N., & Yatno, E. (2009). Karakteristik Spodosols, Kendala dan Potensi Penggunaannya. *Jurnal Sumberdaya Lahan*, *3*(1), 1–14.

Suharyanti, N. A., Mizuno, K., & Sodri, A. (2020). The effect of water deficit on inflorescence period at palm oil productivity on peatland. *E3S Web of Conferences*, *211*, 1–11. https://doi.org/10.1051/e3sconf/202021105005

Sukarman. (2018). *Estimasi Produksi Tandan Kelapa Sawit Berdasarkan Ketersediaan Air dengan Teknik Oil Palm Dissection*. Instiper.

Sukarman, Saidy, A. R., Rusmayadi, G., Adriani, D. E., Primananda, S., Suwardi, Wirianata, H., & Fitriana, C. D. A. (2022). Effect of water deficit of Ultisols, Entisols, Spodosols, and Histosols on oil palm productivity in Central Kalimantan. *Sains Tanah*, *19*(2), 180–191. https://doi.org/10.20961/stjssa.v19i2.65455

Sukarman, Wirianata, H., Budiharjo, K., Primananda, S., & Purwantisari, S. (2021). Estimasi Produksi Tandan Kelapa Sawit Berdasarkan Analisis Ketersediaan Air dengan Teknik Oil Palm Dissection. *Jurnal Biosistem Dan Teknik Pertanian*, *9*(2), 291–299. http://ojs.unud.ac.id/index.php/beta

Sulaiman, A. A., Sulaeman, Y., & Minasny, B. (2019). A framework for the development of wetland for agricultural use in Indonesia. *Resources*, *8*(34), 1–16. https://doi.org/10.3390/resources8010034

Sun, C. X., Xing, C. H., Bo, S. H., Tao, L. X., & Yong, X. (2011). Growth and Physiological Responses to Water and Nutrient Stress in Oil Palm. *African Journal of Biotechnology*, *10*(51), 10465–10471. https://doi.org/10.5897/ajb11.463

Suresh, K., Behera, S. K., Manorama, K., & Mathur, R. K. (2021). Phenological Stages and Degree Days of Oil Palm Crosses Grown Under Irrigation in Tropical Conditions. *Annals of Applied Biology*, *178*(1), 121–128. https://doi.org/10.1111/aab.12641

Surianto. (2015). *Rekayasa Horizon Spodik Tanah Spodosol Sub Group Typic Placorthod Pada Budidaya Kelapa Sawit (Elaeis guineensis Jacq .) Di Kabupaten Barito Timur*. Universitas Sumatera Utara.

Surianto, Rauf, A. T. S., & Sutarta, E. S. (2015). Karakteristik Tanah dan Perbandingan Produksi Kelapa Sawit (Elaeis guineensis Jacq.) dengan Metode Tanam Lubang

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Besar dan Parit Drainase 2:1 pada Lahan Spodosol di Kabupaten Barito Timur Propinsi Kalimantan Tengah - Indonesia. *Jurnal Pertanian Tropik*, *2*(2), 148–158.

Sutarta, E. S., Winarna, & Yusuf, M. A. (2017). Distribusi Hara dalam Tanah dan Produksi Akar Tanaman Kelapa Sawit pada Metode Pemupukan yang Berbeda. *Jurnal Pertanian Tropik*, *4*(1), 84–94.

Suwardi. (2021). *Manajemen Tanah Spodosols Melalui Sistem Pecah Hardpan dan Mounding untuk Meningkatkan Produksi Tanaman Kelapa Sawit*. Instiper.

Suwardi, Sutiarso, L., Wirianata, H., Nugroho, A. P., Pradiko, I., Ginting, E. N., Darlan, N. H., Syarovy, M., Primananda, S., & Sukarman. (2022). Mounding technique improves physiological performance and yield of oil palm on Spodosols. *Sains Tanah*, *19*(2), 221–229. https://doi.org/10.20961/stjssa.v19i2.65460

Suwardi, Sutiarso, L., Wirianata, H., Nugroho, A. P., Sukarman, & Primananda, S. (2023). Substantial Changes in Physical and Chemical Properties of Spodosols Soil by Hardpan Breaking and Mounding in Oil Palm Plantation. *Proceedings of the International Conference on Sustainable Environment, Agriculture and Tourism (ICOSEAT 2022)*, *26*. https://doi.org/10.2991/978-94-6463-086-2_20

Syahputra, J. (2018). *Analisis Makrofauna Tanah Gambut Pada Perkebunan Kelapa Sawit Dengan Usiayang Berbeda Di Kecamatan Bathin Solapan Kabupaten Bengkalis*. Universitas Islam Negeri Sultan Syarif Kasim.

Syarovy, M., Ginting, E. N., Wiratmoko, D., & Santoso, H. (2015). Optimalisasi Pertumbuhan Tanaman Kelapa Sawit di Tanah Spodosol. *Jurnal Pertanian Tropik*, *2*(3), 340–348.

Syuhada, A. B., Shamshuddin, J., Fauziah, C. I., Arifin, A., & Rosenani, A. B. (2014). Formation and Characteristics of Spodosols formed on Sandstone in the Extremely High Rainfall Area of Sarawak, Malaysia. *Asian Journal of Agriculture and Food Science*, *02*(02), 2321–1571. www.ajouronline.com

Taghiyari, H. R., Abbasi, H., Militz, H., & Papadopoulos, A. N. (2021). Fluid Flow of Polar and Less Polar Liquids Through Modified Poplar Wood. *Forests*, *12*(4), 1–10. https://doi.org/10.3390/f12040482

Tang, K., Li, F. Y., Jaesong, S., Liu, Y., Sun, T., Liu, J., Gao, X., & Wang, Y. (2022). Soil water retention capacity surpasses climate humidity in determining soil organic carbon content but not plant production in the steppe zone of Northern China. *Ecological Indicators*, *141*, 109129. https://doi.org/10.1016/J.ECOLIND.2022.109129

Tani, N., Hamid, Z. A. A., Joseph, N., Sulaiman, O., Hashim, R., Arai, T., Satake, A., Kondo, T., & Kosugi, A. (2020). Small Temperature Variations are A Key Regulator of Reproductive Growth and Assimilate Storage in Oil Palm (Elaeis guineensis). *Scientific Reports*, *10*(1). https://doi.org/10.1038/s41598-019-57170-8

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Tao, W., Shao, F., Su, L., Wang, Q., Zhou, B., & Sun, Y. (2023). An analytical model for simulating the rainfall-interception-infiltration-runoff process with non-uniform rainfall. *Journal of Environmental Management*, *344*, 118490. https://doi.org/10.1016/J.JENVMAN.2023.118490

Tezara, W., Domínguez, T. S. T., Loyaga, D. W., Ortiz, R. N., Chila, V. H. R., & Ortega, M. J. B. (2021). Photosynthetic activity of oil palm (Elaeis guineensis) and interspecific hybrid genotypes (Elaeis oleifera × Elaeis guineensis), and response of hybrids to water deficit. *Scientia Horticulturae*, *287*, 110263. https://doi.org/10.1016/J.SCIENTA.2021.110263

Tibbett, M., Fraser, T. D., & Duddigan, S. (2020). Identifying Potential Threats to Soil Biodiversity. *PeerJ*, *8*, 1–29. https://doi.org/10.7717/peerj.9271

Tiemann, T. T., Donough, C. R., Lim, Y. L., Härdter, R., Norton, R., Tao, H. H., Jaramillo, R., Satyanarayana, T., Zingore, S., & Oberthür, T. (2018). Feeding the Palm: A Review of Oil Palm Nutrition. *Advances in Agronomy*, *152*, 149–243. https://doi.org/10.1016/BS.AGRON.2018.07.001

Tsypkin, G. G. (2017). Stability of the Evaporation and Condensation Surfaces in A Porous Medium. *Fluid Dynamics*, *52*(6), 777–785. https://doi.org/10.1134/s0015462817060118

Valverde, Á. M. (2020). Evaluación de la Ceniza Agroindustrial de Palma aceitera en Suelos Acidos del Pacifico Sur, Costa Rica. *Repertorio Cient\'{\i}fico*, *23*(2), 89–111. https://doi.org/10.22458/rc.v23i2.3087

Veloo, R., Van Ranst, E., & Selliah, P. (2015). Peat Characteristics and its Impact on Oil Palm Yield. *NJAS - Wageningen Journal of Life Sciences*, *72–73*, 33–40. https://doi.org/10.1016/J.NJAS.2014.11.001

Vesala, T., Sevanto, S., Grönholm, T., Salmon, Y., Nikinmaa, E., Hari, P., & Hölttä, T. (2017). Effect of Leaf Water Potential on Internal Humidity and CO2 Dissolution: Reverse Transpiration and Improved Water Use Efficiency under Negative Pressure. *Frontiers in Plant Science*, *8*. https://doi.org/10.3389/fpls.2017.00054

Voiku, I. P. (2019). Trends and Prospects of Soil Heating Under Conditions of Protected Ground. *IOP Conference Series: Earth and Environmental Science*, *315*, 22031. https://doi.org/10.1088/1755-1315/315/2/022031

Wang, D., Olatunji, O. A., & Xiao, J. (2019). Thinning increased fine root production, biomass, turnover rate and understory vegetation yield in a Chinese fir plantation. *Forest Ecology and Management*, *440*, 92–100. https://doi.org/10.1016/J.FORECO.2019.03.012

Wang, L., & Ueda, T. (2011). Mesoscale modeling of water penetration into concrete by capillary absorption. *Ocean Engineering*, *38*(4), 519–528. https://doi.org/10.1016/j.oceaneng.2010.12.019

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Wang, Y., Htwe, Y. M., Ihase, L. O., Shi, P., Cao, H., & Lei, X. (2018). Pollen Germination Genes Differentially Expressed in Different Pollens from Dura, Pisifera and Tenera oil palm (Elaeis guineensis jacq.). *Scientia Horticulturae*, *235*, 32–38. https://doi.org/10.1016/j.scienta.2018.02.004

Widayati, S. C. W. (2009). Komparasi Beberapa Metode Estimasi Kesalahan Pengukuran. *Jurnal Penelitian Dan Evaluasi Pendidikan*, *13*(2), 182–197.

Widiastuti, H., Guhardja, E., Sukarno, N., Kosim Darusman, L., Goenadi, H., Smith, S., & Penelitian Bioteknologi, B. (2003). Arsitektur Akar Bibit Kelapa Sawit yang Diinokulasi Beberapa Cendawan Mikoriza arbuskula. *Menara Perkebunan*, *71*(1), 28–43.

Wigena, I. G. P., Subardja, D., & Andriati, A. (2013). Evaluasi Kesesuaian Lahan Mineral Dan Gambut Untuk Peremajaan Tanaman Kelapa Sawit (Studi Kasus Pada Beberapa Kebun Plasma Di Provinsi Riau). *Jurnal Sumberdaya Lahan*, *7*(2).

Wilujeng, R., & Handayanto, E. (2019). Yield Improvement of Maize Grown on an Ultisol through Application of Coal Fly Ash and Oil Palm Empty Fruit Bunch Compost. *Jurnal Tanah Dan Sumberdaya Lahan*, *06*(01), 1043–1054. https://doi.org/10.21776/ub.jtsl.2019.006.1.3

Wiratmoko, D., Darlan, N. H., Winarna, & Purba, A. R. (2015). Teknologi Pengelolaan Lahan Sub Optimal untuk Optimalisasi Produksi Kelapa Sawit. *Seminar Optimalisasi Pemanfaatan Lahan Marginal Untuk Usaha Perkebunan*.

Wiratmoko, D., Winarna, E. L., & Fadli, M. L. (2007). Mengenal Tanah Spodosols dan Kesesuaiannya untuk Tanah Kelapa Sawit. *Warta PPKS*.

Wiweka. (2008). Kapabilitas Citra Hiperspektral. *Berita Dirgantara*, *9*(3), 55–60.

Woittiez, L. S., ., Van Wijk, M. T., Slingerland, M., van Noordwijk, M., & Giller, K. E. (2017). Yield gaps in oil palm: A quantitative review of contributing factors. *European Journal of Agronomy*, *83*, 57–77. https://doi.org/10.1016/J.EJA.2016.11.002

Woittiez, L. S., Slingerland, M., Rafik, R., & Giller, K. E. (2018). Nutritional imbalance in smallholder oil palm plantations in Indonesia. *Nutrient Cycling in Agroecosystems*, *111*(1), 73–86. https://doi.org/10.1007/s10705-018-9919-5

Woittiez, L. S., Wijk, M. T. Van, Slingerland, M., Noordwijk, M. Van, & Giller, K. E. (2017). Yield gaps in oil palm : A quantitative review of contributing factors. *European Journal of Agronomy*, *83*, 57–77. https://doi.org/10.1016/j.eja.2016.11.002

Wu, K., Rodriguez, G. A., Zajc, M., Jacquemin, E., Clément, M., De Coster, A., & Lambot, S. (2019). A new drone-borne GPR for soil moisture mapping. *Remote Sensing of Environment*, *235*, 111456. https://doi.org/10.1016/J.RSE.2019.111456

UNIVERSITAS GADJAH MADA
Smart Estate Technology pada Area Tanah Spodosols di Perkebunan Kelapa Sawit Berbasis Perilaku Air dan Media Perakaran
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Xiang, Q., Kan, A., Yu, X., Liu, F., Huang, H., Li, W., & Gao, R. (2023). Assessment of Topographic Effect on Habitat Quality in Mountainous Area Using InVEST Model. *Land*, *12*(1), 1–17. https://doi.org/10.3390/land12010186

Yakubu, J. A., Onyeodi, U. A., Daniyan, L. O., Shuaibu, A., & Abangwu, U. J. (2022). Space-earth Coupling with Relation to Earths Thermal Capacity: A case study for Nsukka Region, Nigeria. *International Journal of Physical Sciences*, *17*(1), 1–9. https://doi.org/10.5897/ijps2021.4964

Yamashita, M., Ootsuka, C., Kubota, H., Adachi, S., Yamaguchi, T., Murata, K., Yamamoto, T., Ueda, T., Ookawa, T., & Hirasawa, T. (2022). Alleles of high-yielding indica rice that improve root hydraulic conductance also increase flag leaf photosynthesis, biomass, and grain production of japonica rice in the paddy field. *Field Crops Research*, *289*, 108725. https://doi.org/10.1016/J.FCR.2022.108725

Yaseen, M., Fan, G., Zhou, X., Long, W., & Feng, G. (2022). Plant Diversity and Soil Nutrients in a Tropical Coastal Secondary Forest: Association Ordination and Sampling Year Differences. *Forests*, *13*(376), 1–10. https://doi.org/10.3390/f13030376

Yehouessi, L. W., Nodichao, L., Adoukonou-Sagbadja, H., & Ahanhanzo, C. (2019). Genotypic variability in oil palm (*Elaeis guineensis* Jacq.) towards drought damages in Benin (West Africa). *International Journal of Biological and Chemical Sciences*, *13*(3), 1737. https://doi.org/10.4314/ijbcs.v13i3.42

Yousefi, M., Rafie, A. S. M., Aziz, S. A., Azrad, S., & binti ABD Razak, A. (2020). Introduction of Current Pollination Techniques and Factors Affecting Pollination Effectiveness by Elaeidobius Kamerunicus in Oil Palm Plantations on Regional and Global Scale: A review. *South African Journal of Botany*, *132*, 171–179. https://doi.org/10.1016/j.sajb.2020.04.017

Yu, Q., & Flerchinger, G. N. (2015). Extending the Simultaneous Heat and Water (SHAW) Model to Simulate Carbon Dioxide and Water Fluxes over Wheat Canopy. In *Response of Crops to Limited Water* (pp. 191–214). American Society of Agronomy and Soil Science Society of America. https://doi.org/10.2134/advagricsystmodel1.c7

Yuan, C., Mosley, L. M., Fitzpatrick, R., & Marschner, P. (2015). Amount of Organic Matter Required to Induce Sulfate Reduction in Sulfuric Material After Re-Flooding is Affected by Soil Nitrate Concentration. *Journal of Environmental Management*, *151*, 437–442. https://doi.org/10.1016/j.jenvman.2015.01.016

Yuliara, I. M. (2016). *Regresi Linier Sederhana*. Universitas Udayana.

Yulina, H., & Ambarsari, W. (2021). Hubungan Kadar Air Dan Bobot Isi Tanah Terhadap Berat Panen Tanaman Pakcoy Pada Kombinasi Kompos Sampah Kota Dan Pupuk Kandang Sapi. *Jurnal AgroTatanen*, *3*(2), 1–6.

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GADJAH MADA
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Yuwono, R. (2018). *Pengelolaan dan Pemupukan Lahan Marginal untuk Tanaman Kelapa Sawit*.

Zaldívar-Cruz, B., Pérez-Ceballos, R., Zaldívar-Jiménez, A., Canales-Delgadillo, J., Endañu-Huerta, E., Flores, A. B., & Tun-Garrido, J. (2022). Structural and Diversity Changes in Coastal Dunes from the Mexican Caribbean: the Case of the Invasive Australian Pine (Casuarina Equisetifolia). *Management of Biological Invasions*, *13*(1), 131–146. https://doi.org/10.3391/mbi.2022.13.1.08

Zhang, B., Yan, S., Wu, S., Feng, H., & Siddique, K. H. M. (2023). Organic and inorganic fertilizers combined with a water-saving technique increased soil fertilities and apple production in a rainfed hilly orchard. *Journal of Cleaner Production*, *414*, 137647. https://doi.org/10.1016/J.JCLEPRO.2023.137647

Zhang, Y., Chiew, F. H. S., Peña-Arancibia, J., Sun, F., Li, H., & Leuning, R. (2017). Global Variation of Transpiration and Soil Evaporation and the Role of Their Major Climate Drivers. *Journal of Geophysical Research: Atmospheres*, *122*(13), 6868–6881. https://doi.org/10.1002/2017jd027025

Zhang, Z., Huang, M., Pan, Y., Li, Z., Ma, S., & Zhang, Y. (2022). Time-dependent analyses for ground movement and stress field induced by tunnelling considering rainfall infiltration mechanics. *Tunnelling and Underground Space Technology*, *122*, 104378. https://doi.org/10.1016/J.TUST.2022.104378

Zhao, L., Liu, X., Wang, N., Kong, Y., Song, Y., He, Z., Liu, Q., & Wang, L. (2019). Contribution of Recycled Moisture to Local Precipitation in the Inland Heihe River Basin. *Agricultural and Forest Meteorology*, *271*, 316–335. https://doi.org/10.1016/j.agrformet.2019.03.014

Zhou, H., Chen, C., Wang, D., Arthur, E., Zhang, Z., Guo, Z., Peng, X., & Mooney, S. J. (2020). Effect of long-term organic amendments on the full-range soil water retention characteristics of a Vertisol. *Soil and Tillage Research*, *202*, 104663. https://doi.org/10.1016/J.STILL.2020.104663

Zhu, P., Zhang, G., Wang, C., Chen, S., & Wan, Y. (2023). Variation in soil infiltration properties under different land use/cover in the black soil region of Northeast China. *International Soil and Water Conservation Research*. https://doi.org/10.1016/J.ISWCR.2023.07.007