

DAFTAR PUSTAKA

- Acir, N. 2025. Predicting Soil Fertility in Semi-Arid Agroecosystems Using Interpretable Machine Learning Models: A Sustainable Approach for Data-Sparse Regions. *Sustainability (Switzerland)*, 17(16). <https://doi.org/10.3390/su17167547>
- Agosta, M., Schimmenti, E., Di Franco, C. P., & Asciuto, A. 2024. Analysis of the initial steps of the Market Comparison Approach (MCA) for its application to agricultural land: parameters of the market segment and real estate data. *Aestimium*, 83, 33–45. <https://doi.org/10.36253/AESTIM-14497>
- Ahmad, H., & Li, J. 2021. Impact of water deficit on the development and senescence of tomato roots grown under various soil textures of Shaanxi, China. *BMC Plant Biology*, 21(1), 1–16. <https://doi.org/10.1186/s12870-021-03018-1>
- Ahmad, M. N., Anuar, M. I., Aziz, N. A., & Murdi, A. A. 2025. Function and application of Soil Electrical Conductivity (EC) sensor in agriculture: A Review. *Advances In Agricultur And Food Research Jornal*, 6(1), 1–22. <https://doi.org/https://doi.org/10.36877/aafrij.a0000552>
- Aji, A. B., Maroeto, & Arifin, M. 2024. Status Kesuburan Tanah Sebagai Rekomendasi Perbaikan Lahan Pada Berbagai Tingkat Kemiringan Lereng di Kecamatan Wonosalam Kabupaten Jombang. *Agroteknika*, 7(1), 1–10. <https://doi.org/https://doi.org/10.55043/agroteknika.v7i1.236>
- Amara, D. M. K., Benya, I., Kanu, S. A., Saidu, D. H., Musa, R. M., Vonu, O. S., Brima, F., Mboma, J. C. A., Jusu, M., Turay, F., & Kamara, A. 2022. Effect of Land Uses on Soil Erodibility in the Njala Area of Southern Sierra Leone. *Open Journal of Soil Science*, 12(10), 475–489. <https://doi.org/10.4236/ojss.2022.1210019>
- Anđelković, A., Nikolić Jokačević, V., Jokačević, D., & Spalević, V. 2025. Vegetation Cover as a Driver of Sedimentary Organic Matter in Small Water Reservoirs. *Water (Switzerland)*, 17(8), 1–13. <https://doi.org/10.3390/w17081148>
- Anna, P. R. 2022. *Watershed Management*. Blue Rose Publishers.
- Antonangelo, J. A., Culman, S., & Zhang, H. 2024. Comparative analysis and prediction of cation exchange capacity via summation: influence of biochar type and nutrient ratios. *Frontiers in Soil Science*, 4(March), 1–14. <https://doi.org/10.3389/fsoil.2024.1371777>
- Anwar, M. S., & Farhaby, A. M. 2021. Analisis Kebijakan Pemanfaatan Lahan Dalam Wilayah Hutan Mangrove Di Provinsi Bangka Belitung. *University Of Bengkulu Law Journal*, 6(1), 20–38. <https://doi.org/10.33369/ubelaj.6.1.20-38>
- Apriani, N., Arsyad, U., & Mapangaja, B. 2021. Prediksi Erosi Berdasarkan Metode Universal Soil Loss Equation (Usle) Untuk Arahan Penggunaan Lahan Di Daerah Aliran Sungai Lawo. *Jurnal Hutan Dan Masyarakat*, 13(1), 49–63. <https://doi.org/10.24259/jhm.v13i1.10979>

- Aqidah, N., Ibrahim, B., & Saida. 2024. Penentuan Indeks Kesuburan Tanah Pada Beberapa Penggunaan Lahan Di Sub Das Jenelata, Kabupaten Gowa. *AGROTEK: Jurnal Ilmiah Ilmu Pertanian*, 8(1), 76–83. <https://doi.org/https://doi.org/10.33096/agrotek.v8i1.627>
- Ayangbenro, A. S., & Babalola, O. O. 2021. Reclamation of arid and semi-arid soils: The role of plant growth-promoting archaea and bacteria. *Current Plant Biology*, 25, 100173. <https://doi.org/10.1016/j.cpb.2020.100173>
- Barczok, M., Smith, C., Di Domenico, N., Kinsman-Costello, L., & Herndon, E. 2023. Variability in soil redox response to seasonal flooding in a vernal pond. *Frontiers in Environmental Science*, 11(July). <https://doi.org/10.3389/fenvs.2023.1114814>
- Basuki, B., Bambang Hermiyanto, & Subhan Arif Budiman. 2023. Identifikasi Dan Estimasi Kerusakan Tanah Dengan Metode Berbasis Obia Citra Satelit Sentinel-2B Dan Pembobotan Lereng Gunung Raung. *Jurnal Ilmiah Rekayasa Pertanian Dan Biosistem*, 11(1), 56–72. <https://doi.org/10.29303/jrpb.v11i1.443>
- Beillouin, D., Corbeels, M., Demenois, J., Berre, D., Boyer, A., Fallot, A., Feder, F., & Cardinael, R. 2023. A global meta-analysis of soil organic carbon in the Anthropocene. *Nature Communications*, 14(1), 1–10. <https://doi.org/10.1038/s41467-023-39338-z>
- Bhattacharyya, R., Rabbi, S. M. F., Zhang, Y., Young, I. M., Jones, A. R., Dennis, P. G., Menzies, N. W., Kopittke, P. M., & Dalal, R. C. 2021. Soil organic carbon is significantly associated with the pore geometry, microbial diversity and enzyme activity of the macro-aggregates under different land uses. *Science of the Total Environment*, 778, 146286. <https://doi.org/10.1016/j.scitotenv.2021.146286>
- Binada, U. 2023. Dynamics of Contestment of Formal and Informal Institutions in The Public Space in Governance of the Introduction The implementation of. *Policy & Governance Review*, 7(September), 316–331. <https://doi.org/10.30589/pgr>
- Burton, V. J., Baselga, A., De Palma, A., Phillips, H. R. P., Mulder, C., Eggleton, P., & Purvis, A. 2023. Effects of land use and soil properties on taxon richness and abundance of soil assemblages. *European Journal of Soil Science*, 74(6), 1–15. <https://doi.org/10.1111/ejss.13430>
- Chen, L., Luo, Y., Tang, J., Zhang, X., Liu, H., Cui, J., Zheng, J., & Dong, X. 2024. Determination of optimum solum thickness of sloping cropland for maize plantation in an Entisol based on water use strategy and plant traits. *Agricultural Water Management*, 299(April), 108867. <https://doi.org/10.1016/j.agwat.2024.108867>
- Das, B., Pooniya, V., Shivay, Y. S., Zhiipao, R. R., Biswakarma, N., Kumar, D., Saikia, N., Kumar, A., Govindasamy, P., Barman, A., & Critykar, J. 2024. Twenty-one years' impact of using organic amendments on the productivity of rice-wheat rotation and soil properties. *Field Crops Research*, 309, 109311. <https://doi.org/https://doi.org/10.1016/j.fcr.2024.109311>

- Dianita, & Wulandari, S. 2023. Pengaruh Stabilisasi Menggunakan Polypropylene Fiber Terhadap Tanah Lempung Ekspansif. *Jurnal Ilmiah Desain & Konstruksi*, 22(1), 61–71. <https://doi.org/10.35760/dk.2023.v22i1.6482>
- Dong, L., Li, J., Zhang, Y., Bing, M., Liu, Y., Wu, J., Hai, X., Li, A., Wang, K., Wu, P., Shangguan, Z., & Deng, L. 2022. Effects of vegetation restoration types on soil nutrients and soil erodibility regulated by slope positions on the Loess Plateau. *Journal of Environmental Management*, 302, 113985. <https://doi.org/10.1016/j.jenvman.2021.113985>
- Dörner, J., Bravo, S., Stoorvogel, M., Dec, D., Valle, S., Clunes, J., Horn, R., Daniel, U., Wendroth, O., Lagos, L., & Zúñiga, F. 2022. Short-term effects of compaction on soil mechanical properties and pore functions of an Andisol. *Soil and Tillage Research*, 221, 105396. <https://doi.org/10.1016/j.still.2022.105396>
- Dubey, U. K. B., & Kothari, D. P. 2022. *Research Methodology: Techniques and Trends*. United States: CRC Press. <https://doi.org/10.1201/9781315167138>
- Elaloui, A., Khalki, E. M. El, Namous, M., Ziadi, K., Eloudi, H., Faouzi, E., Bou-Imajjane, L., Karroum, M., Trambly, Y., Boudhar, A., & Chehbouni, A. 2023. Soil Erosion under Future Climate Change Scenarios in a Semi-Arid Region. *Water (Switzerland)*, 15(1). <https://doi.org/10.3390/w15010146>
- Flower, K. C., Ward, P. R., Micin, S. F., & Cordingley, N. 2021. Crop rotation can be used to manipulate residue levels under no-tillage in a rainfed Mediterranean-type environment. *Soil and Tillage Research*, 212, 105062. <https://doi.org/10.1016/j.still.2021.105062>
- Franzluebbers, A. J., Farmaha, B. S., Zentella, R., & Kafle, A. 2025. Soil-profile fertility is altered by soil texture and land use across physiographic regions in the southeastern United States. *Agronomy Journal*, 117(2), 1–21. <https://doi.org/10.1002/agj2.70041>
- Fu, B., Chen, L., Huang, H., Qu, P., & Wei, Z. 2021. Impacts of crop residues on soil health: a review. *Environmental Pollutants and Bioavailability*, 33(1), 164–173. <https://doi.org/10.1080/26395940.2021.1948354>
- Gajera, K., Rajani, A., Vekaria, L., & Maheta, A. 2020. Consequence of long-term balance nutrient management on soil nitrogen dynamics under groundnut-wheat cropping sequence in a calcareous clay Soils. *International Journal of Chemical Studies*, 8(5), 1686–1691. <https://doi.org/10.22271/chemi.2020.v8.i5w.10541>
- Gao, M., Li, M., Wang, S., & Lu, X. 2024. Land Degradation Affects Soil Microbial Properties, Organic Matter Composition, and Maize Yield. *Agronomy*, 14(7), 1–15. <https://doi.org/10.3390/agronomy14071348>

- Gondal, A. H., Hussain, I., Ijaz, A. B., Zafar, A., Imran, B., Zafar, H., Danish Sohail, M., Niazi, H., Touseef, M., Khan, A. A., Tariq, M., Yousuf, H., & Usama, M. 2021. Influence of Soil Ph and Microbes on Mineral Solubility and Plant Nutrition: A Review. *International Journal of Agriculture and Biological Sciences*, 5(2), 71–81. <https://doi.org/http://dx.doi.org/10.5281/zenodo.4625364>
- Goud, B. R., Raghavendra, M., Prasad, P. N. S., Hatti, V., Halli, H. M., Nayaka, G. V. V., Suresh, G., Maheshwari, K. S., Adilakshmi, G., Reddy, G. P., & Rajpoot, S. K. 2022. Sustainable management and restoration of the fertility of damaged soils. *Agriculture Issues and Policies*, 113–131. <https://mail.google.com/mail/u/0/?pli=1%5Cnpapers3://publication/uuid/D84FC782-E317-4880-B951-0697213436E1>
- Government Regulation No. 150 Of 2000. 2000. *Peraturan Pemerintah No . 150 Tahun 2000 Tentang : Pengendalian Kerusakan Tanah Untuk Produksi Biomassa. 150.*
- Guan, Y., Grote, K., Schott, J., & Leverett, K. 2022. Prediction of Soil Water Content and Electrical Conductivity using Random Forest Methods with UAV Multispectral and Ground-coupled Geophysical Data. *Remote Sensing*, 14(4). <https://doi.org/10.3390/rs14041023>
- Guliyev, A. 2023. *Macro Element Requirement and Fertilizer Recommendation on Soil Analysis Results For Wheat and Sunflower as Basis of Our Food. December.* <https://doi.org/10.36719/2707-1146/34/44-60>
- Habibi, F., Liu, T., Shahid, M. A., Schaffer, B., & Sarkhosh, A. 2023. Physiological, biochemical, and molecular responses of fruit trees to root zone hypoxia. *Environmental and Experimental Botany*, 206(August 2022), 105179. <https://doi.org/10.1016/j.envexpbot.2022.105179>
- Hadaro, M., Ayele, T., Parshotam Datt, S., & Teshome, R. 2021. Soil Properties as Affected by Soil Conservation Practices and Soil Depths in Uwite Watershed, Hadero Tunto District, Southern Ethiopia. *Applied and Environmental Soil Science*, 2021. <https://doi.org/10.1155/2021/5542326>
- He, F., Mohamadzadeh, N., Sadeghnejad, M., Ingram, B., & Ostovari, Y. 2023. Fractal Features of Soil Particles as an Index of Land Degradation under Different Land-Use Patterns and Slope-Aspects. *Land*, 12(3). <https://doi.org/10.3390/land12030615>
- Hellens, O., Masika, D., & Long'ora, A. 2024. The Effect of Land Cover Change on Soil Erosion in Awach Kibuon Sub-basin, Kenya. *International Journal of Natural Resource Ecology and Management*, 9(3), 82–96. <https://doi.org/10.11648/j.ijnrem.20240903.12>
- Huang, X., Liu, L., Wang, Y., Yang, Y., Zhao, L., Horn, R., & Li, L. 2025. Does soil compaction affect the mobility and transformation behavior of Arsenic - A case study of an Alfisol. *Soil and Tillage Research*, 253, 106659. <https://doi.org/https://doi.org/10.1016/j.still.2025.106659>

- Husein, H. H., Lucke, B., Bäumler, R., & Sahwan, W. 2021. A contribution to soil fertility assessment for arid and semi-arid lands. *Soil Systems*, 5(3). <https://doi.org/10.3390/soilsystems5030042>
- Irfan, I., Marsuni, Y., & Fitriyanti, D. 2021. Eksplorasi Cendawan Rizosfer Asal Tahura Sultan Adam Yang Dapat Bersifat Sebagai Agens Antagonis Terhadap *Fusarium Oxysporum* Secara In Vitro. *Jurnal Proteksi Tanaman Tropika*, 4(2), 348–355. <https://doi.org/10.20527/jppt.v4i2.767>
- Jain, R., & Shrivastava, A. K. 2023. Estimation of Soil Density, Porosity, Water Holding Capacity, and Moisture content of Arpa River Based Soil. *International Research Journal on Advanced Engineering Hub (IRJAEH)*, 1(01), 32–37. <https://doi.org/10.47392/irjaeh.2023.005>
- Jawang, U. P., Ndapamuri, M. H., & Yewa, D. M. 2023. Uji Kualitas Tanah Sebagai Arahan Pengembangan Tanaman Sorgum Di Kelurahan Watumbaka, Kecamatan Pandawai, Kabupaten Sumba Timur. *Jurnal Agro Indragiri*, 9(2), 36–43. <https://doi.org/10.32520/jai.v9i2.2570>
- Jeni, K. B. J., Maroeto, M., & Purwadi, P. 2023. Kajian Baku Kerusakan Tanah pada Berbagai Penggunaan Lahan di Desa Sukodono Kecamatan Dampit Kabupaten Malang, Indonesia. *Agro Bali : Agricultural Journal*, 6(1), 150–162. <https://doi.org/10.37637/ab.v6i1.1112>
- Jiang, Y., Huang, J., Guo, X., Ye, Y., Liu, J., & Jiang, Y. 2025. Factors Influencing the Spatial Distribution of Soil Total Phosphorus Based on Structural Equation Modeling. *Agriculture (Switzerland)*, 15(9). <https://doi.org/10.3390/agriculture15091013>
- Kalbali, S., Ghorbani-Dashtaki, S., Naderi, M., & Mirzaee, S. 2017. Effect of Rock Fragment Cover on Hydraulics Properties of Surface Flows and Rill Initiation with Simulating Runoff under Natural Conditions. *Water and Soil*, 31(1), 75–85. <https://doi.org/https://doi.org/10.22067/jsw.v31i1.51812>
- Kebebew, S., Bedadi, B., Erkossa, T., Yimer, F., & Wogi, L. 2022. Effect of Different Land-Use Types on Soil Properties in Cheha District, South-Central Ethiopia. *Sustainability (Switzerland)*, 14(3). <https://doi.org/10.3390/su14031323>
- Khan, M. T., Supronienė, S., Žvirdauskienė, R., & Aleinikovienė, J. 2025. Climate, Soil, and Microbes: Interactions Shaping Organic Matter Decomposition in Croplands. *Agronomy*, 15(8), 1–31. <https://doi.org/10.3390/agronomy15081928>
- Khan, S., Irshad, S., Mehmood, K., Hasnain, Z., Nawaz, M., Rais, A., Gul, S., Wahid, M. A., Hashem, A., Fathi, E., & Ibrar, D. 2024. Biochar Production and Characteristics, Its Impacts on Soil Health, Crop Production, and Yield Enhancement: A Review. *Plants*, 13(166), 1–18. <https://doi.org/https://doi.org/10.3390/plants13020166>
- Killa, Y. M., Ndapamuri, M. H., Ratu, E. U., & Teul, M. U. 2024. Kajian Sifat Fisik Tanah pada Lahan Kering Beriklim Kering di Kecamatan Wulla Wajelu Kabupaten Sumba Timur. *Jurnal Galung Tropika*, 13(1), 19–26. <https://doi.org/10.31850/jgt.v13i1.1161>

- Koné, I., Kouadio, K. K. H., Kouadio, E. N., Agyare, W. A., Owusu-Prempeh, N., Amponsah, W., & Gaiser, T. 2022. Assessment of soil fertility status in cotton-based cropping systems in Cote d'Ivoire. *Frontiers in Soil Science*, 2(August), 1–12. <https://doi.org/10.3389/fsoil.2022.959325>
- Krisnayanti, N. K. A., Trigunasih, N. M., & Narka, I. W. 2023. Analisis Potensi dan Status Kerusakan Tanah pada Lahan Kering Berbasis Sistem Informasi Geografis di Kecamatan Baturiti, Kabupaten Tabanan, Provinsi Bali. *Agrotrop : Journal on Agriculture Science*, 13(1), 124. <https://doi.org/10.24843/ajoas.2023.v13.i01.p11>
- Kulsrestha, S. 2023. Effect of Climate Change on Soil Erosion: a Report. *International Journal of Advanced Research*, 11(02), 962–980. <https://doi.org/10.21474/ijar01/16333>
- Kumar, A., & Ahuja, R. 2025. Prediction of permeability of amended soil using ensembled artificial intelligence models. *AI in Civil Engineering*, 4(1). <https://doi.org/10.1007/s43503-025-00052-y>
- Laurentiis, V. De, Maier, S., Horn, R., Uusitalo, V., Hiederer, R., Chéron-Bessou, C., Morais, T., Grant, T., Milà i Canals, L., & Sala, S. 2024. Soil organic carbon as an indicator of land use impacts in life cycle assessment. *International Journal of Life Cycle Assessment*, 29(7), 1190–1208. <https://doi.org/10.1007/s11367-024-02307-9>
- Lee, J. W., Park, S. R., & Lee, S. W. 2023. Effect of Land Use on Stream Water Quality and Biological Conditions in Multi-Scale Watersheds. *Water (Switzerland)*, 15(24). <https://doi.org/10.3390/w15244210>
- Li, J., Li, S., Zhao, R., Xing, S., Chen, H., Huang, Y., Zhang, L., & Li, J. 2025. Soil organic carbon dynamics (2008–2020) across different cultivated land use types in a subtropical region. *Geoderma Regional*, 40(September 2024). <https://doi.org/10.1016/j.geodrs.2025.e00926>
- Li, X., Luo, J., Jin, X., He, Q., & Niu, Y. 2020. Improving soil thickness estimations based on multiple environmental variables with stacking ensemble methods. *Remote Sensing*, 12(21), 1–21. <https://doi.org/10.3390/rs12213609>
- Li, X., Zhu, W., Xu, F., Du, J., Tian, X., Shi, J., & Wei, G. 2021. Organic amendments affect soil organic carbon sequestration and fractions in fields with long-term contrasting nitrogen applications. *Agriculture, Ecosystems and Environment*, 322(August), 107643. <https://doi.org/10.1016/j.agee.2021.107643>
- Lias, S. A., & Syahrul. 2021. Pemetaan Potensi Kerusakan Tanah Di Kabupaten Polewali Mandar. *Jurnal Ecosolum*, 10(2), 94–108. <https://doi.org/10.20956/ecosolum.v10i2.19533>
- Linquist, B. A., Campbell, J. C., & Southard, R. J. 2022. Assessment of potassium soil balances and availability in high yielding rice systems. *Nutrient Cycling in Agroecosystems*, 122(3), 255–271. <https://doi.org/10.1007/s10705-022-10200-w>

- Listianto, F. G., Peniwiratri, L., & Ratih, Y. W. 2023. Evaluasi Status Kesuburan Kimia Tanah Pada Kawasan Perbukitan Menoreh Di Desa Bigaran Kecamatan Borobudur Kabupaten Magelang Jawa Tengah Evaluation of Soil Chemical Fertility Status in the Menoreh Hills Area in Bigaran Village Borobudur District Magelang. *Jurnal Pertanian Agros*, 25(4), 3423–3430.
- Liu, P., Chen, H., Li, X., You, L., Chen, Q., Zhang, M., & Liu, Z. 2025. 11 years of controlled-release potassium fertilization reshaped maize ecosystems and drove sustainable soil quality: insights from physical-chemical-biological interactions. *Journal of Environmental Management*, 393, 127160. <https://doi.org/https://doi.org/10.1016/j.jenvman.2025.127160>
- Liu, Z., Yuan, X., Zhang, Z., Yang, X., Ai, C., Wang, Z., Fan, Q., & Xu, X. 2025. Revisiting potassium-induced impacts on crop production and soil fertility based on thirty-three Chinese long-term experiments. *Field Crops Research*, 322, 109732. <https://doi.org/https://doi.org/10.1016/j.fcr.2024.109732>
- Luo, L., Lin, K., Tao, L., Luo, C., Wang, J., Duan, T., Liu, Y., Fu, X., Guo, S., & Liu, Y. 2025. Effects of stand structure and soil depth on soil properties in *Cryptomeria japonica* plantations. *Frontiers in Forests and Global Change*, 8(April), 1–11. <https://doi.org/10.3389/ffgc.2025.1548485>
- Ma, J., Yin, B., Gao, T., He, K., Huang, X., Jiang, T., & Zhen, W. 2025. Legume–Non-Legume Cover Crop Mixtures Enhance Soil Nutrient Availability and Physical Properties: A Meta-Analysis Across Chinese Agroecosystems. *Agronomy*, 15(8), 1756. <https://doi.org/10.3390/agronomy15081756>
- Ma, X., Li, X., Meng, Y., Liu, J., Wang, J., Yu, X., Wang, W., & Xu, X. 2025. Influence of Soil Depth and Land Use Type on the Diversity of and Metabolic Restriction in the Soil Microbial Community of a Forest-Grass Ecotone. *Microorganisms*, 13(7), 1–20. <https://doi.org/10.3390/microorganisms13071450>
- Mairura, F. S., Musafiri, C. M., Kiboi, M. N., Macharia, J. M., Ng’etich, O. K., Shisanya, C. A., Okeyo, J. M., Okwuosa, E. A., & Ngetich, F. K. 2022. Farm factors influencing soil fertility management patterns in Upper Eastern Kenya. *Environmental Challenges*, 6(August 2021), 100409. <https://doi.org/10.1016/j.envc.2021.100409>
- Makkasau, A. R., Malamassam, D., & Umar, A. 2021. Mapping of environmental supporting capacity based on ecosystem services in Wajo Regency 2021. *IOP Conference Series: Earth and Environmental Science*, 870(1). <https://doi.org/10.1088/1755-1315/870/1/012019>
- Maroeto, M., Priyadarshini, R., Siswanto, S., Idhom, M., & Santoso, W. 2022. Study on the Potential of Forest Areas in Aspects of Land Fertility In Wonosalam District, Jombang Regency. *Nusantara Science and Technology Proceedings*, 2022, 22–30. <https://doi.org/10.11594/nstp.2022.2004>
- Maroeto, Priyadarshini, R., & Santoso, W. 2021. Standard Evaluation of Damage to Critical Lands in Medium Plains in Pasuruan Regency. *Nusantara Science and Technology Proceedings*, 2021, 24–31. <https://doi.org/https://doi.org/10.11594/nstp.2021.1505>

- Maroeto, Priyadarshini, R., & Santoso, W. 2024. Assessment of Land Resources Evaluation Based on Land Capacity and Fertility Perspectives for Agricultural Commodities in Lesti Sub-Watershed. *Siberian Journal of Life Sciences and Agriculture*, 16(2), 198–212. <https://doi.org/10.12731/2658-6649-2024-16-2-820>
- Mattila, T. J. 2024. Redox potential as a soil health indicator – how does it compare to microbial activity and soil structure? *Plant and Soil*, 494(1–2), 617–625. <https://doi.org/10.1007/s11104-023-06305-y>
- Mattila, T. J., & Rajala, J. 2022. Estimating cation exchange capacity from agronomic soil tests: Comparing Mehlich-3 and ammonium acetate sum of cations. *Soil Science Society of America Journal*, 86(1), 47–50. <https://doi.org/10.1002/saj2.20340>
- Mbibueh, B. T., Fokeng, R. M., Tellen, V. A., & Tawe, I. T. 2025. Land use and topographic controls on soil chemical properties in some selected sites of the North West Region of Cameroon. *Geology, Ecology, and Landscapes*, 9(2), 753–774. <https://doi.org/10.1080/24749508.2024.2328899>
- Milewski, R., Schmid, T., Chabrilat, S., Jiménez, M., Escribano, P., Pelayo, M., & Ben-Dor, E. 2022. Analyses of the Impact of Soil Conditions and Soil Degradation on Vegetation Vitality and Crop Productivity Based on Airborne Hyperspectral VNIR–SWIR–TIR Data in a Semi-Arid Rainfed Agricultural Area (Camarena, Central Spain). *Remote Sensing*, 14(20). <https://doi.org/10.3390/rs14205131>
- Minina, N. N., Makhmutov, A. R., & Sinelnikova, O. V. 2022. Agrochemical characteristics of soils in the vicinity of the village of Mishkino, Mishkinsky district of the Republic of Bashkortostan. *IOP Conference Series: Earth and Environmental Science*, 1043(1). <https://doi.org/10.1088/1755-1315/1043/1/012053>
- Minister of Environment Regulation No. 07 of 2006. 2006. Peraturan Menteri Negara Lingkungan Hidup Nomor 07 Tahun 2006 Tentang Tata Cara Pengukuran Kriteria Baku Kerusakan Tanah Untuk Produksi Biomassa. *Jakarta*, 1–21.
- Mockeviciene, I., Karcauskiene, D., Slepeticene, A., Vilkiene, M., Repsiene, R., Braziene, Z., & Anne, O. 2022. Influence of Liming Intensity on Fractions of Humified Organic Carbon in Acid Soil: A Case Study. *Sustainability (Switzerland)*, 14(9). <https://doi.org/10.3390/su14095297>
- Monde, A., Somba, B. E., & Rahman, A. 2023. The condition of chemical properties in the soil on the liquefied land in Jono Oge Village, Sigi Regency, Central Sulawesi. *IOP Conference Series: Earth and Environmental Science*, 1253(1), 0–6. <https://doi.org/10.1088/1755-1315/1253/1/012112>
- Montoya, W. C., Cerón, G. C., & Correa, Cuervo, J. 2017. Soil moisture retention and mass movement of volcanic soils from the “Sabinas” sector in Caldas, Colombia. *Acta Agronómica*, 66(4), 588–597. <https://doi.org/https://doi.org/10.15446/acag.v66n4.60461>

- Moratelli, F. A., Alves, M. A. B., Borella, D. R., Kraeski, A., Almeida, F. T. de, Zolin, C. A., Hoshide, A. K., & Souza, A. P. de. 2023. Effects of Land Use on Soil Physical-Hydric Attributes in Two Watersheds in the Southern Amazon, Brazil. *Soil Systems*, 7(4). <https://doi.org/10.3390/soilsystems7040103>
- Mosaffaie, J., Jam, A. S., Tabatabaei, M. R., & Kousari, M. R. 2021. Trend assessment of the watershed health based on DPSIR framework. *Land Use Policy*, 100, 104911. <https://doi.org/10.1016/j.landusepol.2020.104911>
- Msimbira, L. A., & Smith, D. L. 2020. The Roles of Plant Growth Promoting Microbes in Enhancing Plant Tolerance to Acidity and Alkalinity Stresses. *Frontiers in Sustainable Food Systems*, 4(July), 1–14. <https://doi.org/10.3389/fsufs.2020.00106>
- Munnaf, M. A., & Mouazen, A. M. 2021. Development of a soil fertility index using on-line Vis-NIR spectroscopy. *Computers and Electronics in Agriculture*, 188(April), 106341. <https://doi.org/10.1016/j.compag.2021.106341>
- Murthado, D. A. 2021. Dampak Industrialisasi Tambak Udang Terhadap Lingkungan Di Desa Andulang Kecamatan Gapura Kabupaten Sumenep. *Jurnal Setia Pancasila*, 2(1), 1–7. <https://doi.org/https://doi.org/10.36379/jsp.v2i1.175>
- Mustafa, A. rahman A., Abdelsamie, E. A., Mohamed, E. S., Rebouh, N. Y., & Shokr, M. S. 2024. Modeling of Soil Cation Exchange Capacity Based on Chemometrics, Various Spectral Transformations, and Multivariate Approaches in Some Soils of Arid Zones. *Sustainability (Switzerland)*, 16(16). <https://doi.org/10.3390/su16167002>
- Mustafa, R., & Ansari, A. 2024. Comprehensive analysis of soil electrical conductivity: an experimental and machine learning approach. *Discover Civil Engineering*, 1(1). <https://doi.org/10.1007/s44290-024-00086-8>
- Nailussa'adah, F., Maroeto, & Purwadi. 2023. Status Kerusakan Tanah Pada Berbagai Penggunaan Lahan Di DAS Welang Wilayah Tengah Kabupaten Pasuruan. *J. Solum*, 1(1), 29–38. <https://doi.org/10.25077/jsolum.20.1.29-38.2023>
- Ni, S., Shi, B., Zhao, J., Wang, D., Zhu, L., Wang, J., & Cai, C. 2024. A review of impacts of soil rock fragments on slope erosion: Mechanism and processes. *Land Degradation & Development*, 35(10), 3226–3243. <https://doi.org/https://doi.org/10.1002/ldr.5138>
- Niu, C., Shi, Y., Fan, G., Ye, Y., Zhang, J., Sang, Y., & Zhang, Z.-H. 2024. Effect of rock fragments on soil water and nutrient: a case study in rocky mountain area of North China. *Journal of Soil Science and Plant Nutrition*, 24(1), 716–731. <https://doi.org/https://doi.org/10.1007/s42729-023-01578-9>
- Nurhartanto, N., Zulkarnain, Z., & Wicaksono, A. A. 2021. Analisis Beberapa Sifat Fisik Tanah Sebagai Indikator Kerusakan Tanah Pada Lahan Kering. *Journal of Tropical AgriFood*, 4, 107–112. <https://doi.org/10.35941/jatl.4.2.2022.7001.107-112>

- Olaniyan, F. T., Alori, E. T., Adekiya, A. O., Ayorinde, B. B., Daramola, F. Y., Osemwegie, O. O., & Babalola, O. O. 2022. The use of soil microbial potassium solubilizers in potassium nutrient availability in soil and its dynamics. *Annals of Microbiology*, 72(1). <https://doi.org/10.1186/s13213-022-01701-8>
- Pacini, L., Yunta, F., Jones, A., Montanarella, L., Barrè, P., Saia, S., Chen, S., & Schillaci, C. 2023. Fine earth soil bulk density at 0.2 m depth from Land Use and Coverage Area Frame Survey (LUCAS) soil 2018. *European Journal of Soil Science*, 74(4), 1–11. <https://doi.org/10.1111/ejss.13391>
- Panagos, P., De Rosa, D., Liakos, L., Labouyrie, M., Borrelli, P., & Ballabio, C. 2024. Soil bulk density assessment in Europe. *Agriculture, Ecosystems and Environment*, 364(December 2023), 108907. <https://doi.org/10.1016/j.agee.2024.108907>
- Permana, G. B., Rahim, A. R., & Aminin, A. 2021. Growth Analysis of Three Aquatic Commodities Cultivated With Polyculture Systems At Different Densities. *Kontribusi (Research Dissemination for Community Development)*, 4(2), 437. <https://doi.org/10.30587/kontribusi.v4i2.2662>
- Plaza, C., García-Palacios, P., Berhe, A. A., Barquero, J., Bastida, F., Png, G. K., Rey, A., Bardgett, R. D., & Delgado-Baquerizo, M. 2022. Ecosystem productivity has a stronger influence than soil age on surface soil carbon storage across global biomes. *Communications Earth and Environment*, 3(1), 1–8. <https://doi.org/10.1038/s43247-022-00567-7>
- Prescott, C. E., & Vesterdal, L. 2021. Decomposition and transformations along the continuum from litter to soil organic matter in forest soils. *Forest Ecology and Management*, 498(July), 119522. <https://doi.org/10.1016/j.foreco.2021.119522>
- Rayes, M. L. 2006. *Metode Inventarisasi Sumberdaya Lahan. Penerbit Andi*.
- Rebello, S., Nathan, V. K., Sindhu, R., Binod, P., Awasthi, M. K., & Pandey, A. 2021. Bioengineered microbes for soil health restoration: present status and future. *Bioengineered*, 12(2), 12839–12853. <https://doi.org/10.1080/21655979.2021.2004645>
- Robinson, D. A., Thomas, A., Reinsch, S., Lebron, I., Feeney, C. J., Maskell, L. C., Wood, C. M., Seaton, F. M., Emmett, B. A., & Cosby, B. J. 2022. Analytical modelling of soil porosity and bulk density across the soil organic matter and land-use continuum. *Scientific Reports*, 12(1), 1–13. <https://doi.org/10.1038/s41598-022-11099-7>
- Romadhon, M. R., & Hermiyanto, B. 2021. Penentuan Indeks Kesuburan Tanah di Sub DAS Dinoyo, Kabupaten Jember Determination. *Jurnal Tanah Dan Iklim*, 45(1), 27–37. <https://doi.org/http://dx.doi.org/10.21082/jti.v45n1.2021.27-37>
- Rutebuka, J., Uwimanzu, A. M., Nkundwakazi, O., Kagabo, D. M., Mbonigaba, J. J. M., Vermeir, P., & Verdoodt, A. 2021. Effectiveness of terracing techniques for controlling soil erosion by water in Rwanda. *Journal of Environmental Management*, 277, 111369. <https://doi.org/https://doi.org/10.1016/j.jenvman.2020.111369>

- Samantaray, S., Sahoo, A., & Ghose, D. K. 2021. *Watershed Management and Applications of AI*. CRC Press.
- Sersenmudi, H. L., Aristotulus, E. T., & Tarore, R. C. 2022. Analisis Persebaran Lahan Kritis di Kecamatan Lolak Kabupaten Bolaang Mongondow. *Jurnal Perencanaan Dan Wilayah Kota*, 9(1), 31–39. <https://doi.org/https://doi.org/10.35793/sp.v9i1.41847>
- Soil Research Center. 1995. *The combination of several chemical properties of the soil and its fertility status*. Pusat Penelitian Tanah, Bogor.
- Soil Survey Staff. 2022. Keys to Soil Taxonomy, 13th edn. *USDA Natural Resources Conservation Service*, 410. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051546.pdf
- Solly, E. F., Weber, V., Zimmermann, S., Walthert, L., Hagedorn, F., & Schmidt, M. W. I. 2020. A Critical Evaluation of the Relationship Between the Effective Cation Exchange Capacity and Soil Organic Carbon Content in Swiss Forest Soils. *Frontiers in Forests and Global Change*, 3(September), 1–12. <https://doi.org/10.3389/ffgc.2020.00098>
- Srivastava, A. K., Wu, Q. S., Mousavi, S. M., & Hota, D. 2021. Integrated Soil Fertility Management in Fruit Crops: An Overview. *International Journal of Fruit Science*, 21(1), 413–439. <https://doi.org/10.1080/15538362.2021.1895034>
- Suwardi, W., P., Eka Kusuma K., R., & Hanifa, H. 2021. Identifikasi Degradasi Lahan Berdasarkan Sifat Fisika Tanah di DAS Merawu, Banjarnegara, Jawa Tengah. *Geo Spatial Proceeding*, 1–23.
- Szabó, J. A., Keller, B., Centeri, C., Hatvani, I. G., Kovács, J., Szalai, Z., & Jakab, G. 2023. Varying particle size selectivity of soil erosion along a cultivated catena. *Open Geosciences*, 15(1). <https://doi.org/10.1515/geo-2022-0585>
- Tang, X., & Adesina, J. A. 2022. Integrated Watershed Management Framework and Groundwater Resources in Africa—A Review of West Africa Sub-Region. *Water (Switzerland)*, 14(3). <https://doi.org/10.3390/w14030288>
- Tano, B. F., Brou, C. Y., Dossou-Yovo, E. R., Saito, K., Futakuchi, K., Wopereis, M. C. S., & Husson, O. 2020. Spatial and temporal variability of soil redox potential, pH and electrical conductivity across a toposequence in the savanna of west Africa. *Agronomy*, 10(11), 1–22. <https://doi.org/10.3390/agronomy10111787>
- Tedersoo, L. 2020. *Regional-Scale In-Depth Analysis of Soil Fungal Diversity Reveals Strong pH and Plant Species Effects in Northern Europe*. 11(September), 1–31. <https://doi.org/10.3389/fmicb.2020.01953>
- Wang, J., Shrestha, N. K., Delavar, M. A., Meshesha, T. W., & Bhanja, S. N. 2021. Modelling watershed and river basin processes in cold climate regions: A review. *Water (Switzerland)*, 13(4), 1–19. <https://doi.org/10.3390/w13040518>

- Wang, J., Zhen, J., Hu, W., Chen, S., Lizaga, I., Zeraatpisheh, M., & Yang, X. 2023. Remote sensing of soil degradation: Progress and perspective. *International Soil and Water Conservation Research*, 11(3), 429–454. <https://doi.org/10.1016/j.iswcr.2023.03.002>
- Wang, S., Wang, M., Gao, X., Zhao, W., Miao, P., Liu, Y., Zhang, R., Wang, X., Sui, X., & Li, M. H. 2024. The Diversity and Composition of Soil Microbial Communities Differ in Three Land Use Types of the Sanjiang Plain, Northeastern China. *Microorganisms*, 12(4). <https://doi.org/10.3390/microorganisms12040780>
- Wang, Y., Cui, Y., Wang, K., He, X., Dong, Y., Li, S., Wang, Y., Yang, H., Chen, X., & Zhang, W. 2023. The agronomic and environmental assessment of soil phosphorus levels for crop production: a meta-analysis. *Agronomy for Sustainable Development*, 43(2). <https://doi.org/10.1007/s13593-023-00887-8>
- Wardana, V. S., & Simanjuntak, B. H. 2023. Assessment of Factors Affecting Agricultural Soil Damage in the Upper Stream Sub-Watershed. *Jurnal Teknik Pertanian Lampung (Journal of Agricultural Engineering)*, 12(3), 559. <https://doi.org/10.23960/jtep-l.v12i3.559-570>
- Wardhani, E., & Safwani, S. R. 2023. Evaluasi Kualitas Tanah di Kabupaten Cianjur, Jawa Barat. *Jurnal Serambi Engineering*, 8(2), 5217–5227. <https://doi.org/https://doi.org/10.32672/jse.v8i2.5969>
- Watershed Management Center Brantas. 2021. *Monitoring and Evaluation Report on the Performance of the Brantas Watershed in 2021*.
- Wen, M., Liu, Y., Feng, C., & Li, Z. 2024. Metagenomic Analysis Reveals the Effects of Different Land Use Types on Functional Soil Phosphorus Cycling: A Case Study of the Yellow River Alluvial Plain. *Microorganisms*, 12(11). <https://doi.org/10.3390/microorganisms12112194>
- Wiwoho, B. S., & Astuti, I. S. 2022. Runoff observation in a tropical Brantas watershed as observed from long-term globally available TerraClimate data 2001–2020. *Geoenvironmental Disasters*, 9(1). <https://doi.org/10.1186/s40677-022-00214-5>
- Xia, Y., Feng, J., Zhang, H., Xiong, D., Kong, L., Seviour, R., & Kong, Y. 2024. Effects of soil pH on the growth, soil nutrient composition, and rhizosphere microbiome of *Ageratina adenophora*. *PeerJ*, 12(4), 1–22. <https://doi.org/10.7717/peerj.17231>
- Xiang, H., Xu, J., Yang, H., Song, J., & Yu, X. 2024. Reduced Soil Quality but Increased Microbial Diversity in Cultivated Land Compared to Other Land-Use Types in the Longzhong Loess Plateau. *Agriculture (Switzerland)*, 14(12). <https://doi.org/10.3390/agriculture14122106>
- Xu, S., Zhang, W., Goodwin, P. H., Wang, Y., Zheng, S.-J., & Li, X. 2024. Effect of cover crop on soil fertility and bacterial diversity in a banana plantation in southwestern China. *Soil and Tillage Research*, 240, 106092. <https://doi.org/https://doi.org/10.1016/j.still.2024.106092>

- Xu, Y., Changfei, L., & Xiuxian, L. 2025. *Organic-inorganic amendments regulate paddy soil redox properties and nutrient supply to enhance rice yield and nutrient use efficiency*. 1–24. <https://doi.org/https://doi.org/10.21203/rs.3.rs-7146787/v1> License:
- Yang, Y., Meng, Z., Li, H., Gao, Y., Li, T., & Qin, L. 2024. Soil porosity as a key factor of soil aggregate stability: insights from restricted grazing. *Frontiers in Environmental Science*, 12(January), 1–13. <https://doi.org/10.3389/fenvs.2024.1535193>
- Yang, Y., Shen, Z., Bissett, A., & Viscarra Rossel, R. A. 2022. Estimating soil fungal abundance and diversity at a macroecological scale with deep learning spectrotransfer functions. *Soil*, 8(1), 223–235. <https://doi.org/10.5194/soil-8-223-2022>
- Yin, Y., Li, G., Xia, Y., Wu, M., Huang, M., Zhai, L., Fan, X., Zhou, J., Kong, X., Zhang, F., & Riaz, M. 2024. How to effectively reduce sloping farmland nutrient loss and soil erosions in the Three Gorges Reservoir area. *Agricultural Water Management*, 304(May), 109084. <https://doi.org/10.1016/j.agwat.2024.109084>
- Yüksel, E. E., & Yavuz, G. 2024. Evaluating the Soil Properties of Different Land Use Types in the Deviskel Watershed in the Hilly Region of Northeast Türkiye. *Sustainability (Switzerland)*, 16(22). <https://doi.org/10.3390/su16229732>
- Zhang, J., Qu, X., Song, X., Xiao, Y., Wang, A., & Li, D. 2023. Spatial Variation in Soil Base Saturation and Exchangeable Cations in Tropical and Subtropical China. *Agronomy*, 13(3). <https://doi.org/10.3390/agronomy13030781>
- Zhang, R., Meng, T., Sun, Z., & Liu, Z. 2025. Effects of applying different organic and inorganic soil amendments to improve the late stage of reclaimed soil from abandoned homesteads on soil nutrients and maize yield. *Frontiers in Sustainable Food Systems*, 9(March), 1–10. <https://doi.org/10.3389/fsufs.2025.1542710>
- Zhang, Y., Chen, X., Geng, S., & Zhang, X. 2025. A review of soil waterlogging impacts, mechanisms, and adaptive strategies. *Frontiers in Plant Science*, 16(February), 1–15. <https://doi.org/10.3389/fpls.2025.1545912>
- Zhang, Y., Hartemink, A. E., Vanwalleghe, T., Bonfatti, B. R., & Moen, S. 2024. Climate and land use changes explain variation in the A horizon and soil thickness in the United States. *Communications Earth and Environment*, 5(1). <https://doi.org/10.1038/s43247-024-01299-6>
- Zheng, Y., Chen, N., Zhang, C., Dong, X., & Zhao, C. 2021. Effects of Rock Fragments on the Soil Physicochemical Properties and Vegetation on the Northeastern Tibetan Plateau. *Frontiers in Environmental Science*, 9(June), 1–11. <https://doi.org/10.3389/fenvs.2021.693769>
- Zhi, Q., Yuying, J., Tong, H., Yingshuang, L., Xinliang, X., & Jun, Y. 2022. Land use change simulation: progress, challenges, and prospects. *Shengtai Xuebao*, 45(13), 5165–5176. <https://doi.org/10.5846/stxb202106201639>

Ziyang, G., & Jinchun, C. 2022. Method for predicting unsaturated permeability using basic soil properties. *Transportation Geotechnics*, 34, 100754. <https://doi.org/https://doi.org/10.1016/j.trgeo.2022.100754>