

DAFTAR PUSTAKA

- Adams, N. H., Umar, R., Ishaya, S., Nweke, O. D., Ilyasu, N. S., Jagaba, A. H., Usman, S., & Yakasai, H. M. (2024). Chlorpyrifos degradation by *Bacillus* sp. strain UPMB10 isolated from polluted environment: Analysis and characterization of the metabolite by GC-MS. *Case Studies in Chemical and Environmental Engineering*, 9: 100608. doi.org/10.1016/j.cscee.2024.100608
- Afshar, S. V., Boldrin, A., Astrup, T. F., Daugaard, A. E., & Hartmann, N. B. (2024). Degradation of biodegradable plastics in waste management systems and the open environment: A critical review. *Journal of Cleaner Production*, 434(August 2023), 140000. <https://doi.org/10.1016/j.jclepro.2023.140000>
- Ahmad, M. F., Ahmad, F. A., Alsayegh, A. A., Zeyaulah, M., AlShahrani, A. M., Muzammil, K., Saati, A. A., Wahab, S., Elbendary, E. Y., Kambal, N., Abdelrahman, M. H., & Hussain, S. (2024). Pesticides impacts on human health and the environment with their mechanisms of action and possible countermeasures. *Heliyon*, 10(7), e29128. doi.org/10.1016/j.heliyon.2024.
- Arias-Castro, E., Castrejón-Godínez, M. L., Mussali-Galante, P., Tovar-Sánchez, E., & Rodríguez, A. (2025). Pesticides Degradation Through Microorganisms Immobilized on Agro-Industrial Waste: A Promising Approach for Their Elimination from Aquatic Environments. *Processes*, 13(4), 1–24. <https://doi.org/10.3390/pr13041073>
- Arik, M. A., Yalçın, E., Çavuşoğlu, K., & Özkan, B. (2025). Integrated Evaluation of Methidathion-Induced Toxicity in *Allium Ceba* with A Multifactorial Biological Approach. *Scientific Reports*, 15, 38172. <https://doi.org/10.1038/s41598-025-22021-2>
- Aroniadou-Anderjaska, V., Figueiredo, T. H., de Araujo Furtado, M., Pidoplichko, V. I., & Braga, M. F. M. (2023). Mechanisms of Organophosphate Toxicity and the Role of Acetylcholinesterase Inhibition. *Toxics*, 11(10), 866. <https://doi.org/10.3390/toxics11100866>
- Asante, J., Abia, A. L. K., Anokwah, D., Hetsa, B. A., Fatoba, D. O., Bester, L. A., & Amoako, D. G. (2023). Phenotypic and Genomic Insights into Biofilm Formation in Antibiotic-Resistant Clinical Coagulase-Negative *Staphylococcus* Species from South Africa. *Genes*, 14(1), 104. <https://doi.org/10.3390/genes14010104>
- Asma, S. T., Imre, K., Morar, A., Herman, V., Acaroz, U., Mukhtar, H., Arslan-Acaroz, D., Shah, S. R. A., & Gerlach, R. (2022). An Overview of Biofilm Formation–Combating Strategies and Mechanisms of Action of Antibiofilm Agents. *Life*, 12(8), 1–31. <https://doi.org/10.3390/life12081110>

- Avgoulas, D. I., Petala, M., Briandet, R., Dergham, Y., Noirot-Gros, M. F., Konstantinidis, A., Kostoglou, M., & Karapantsios, T. D. (2024). Effect of surface treatment and shear flow on biofilm formation over materials employed in space water storage and distribution systems. *Frontiers in Materials*, 11(May), 1–13. <https://doi.org/10.3389/fmats.2024.1401764>
- Ayilara, M. S., & Babalola, O. O. (2023). Bioremediation of environmental wastes: the role of microorganisms. *Frontiers in Agronomy*, 5(May), 1–15. <https://doi.org/10.3389/fagro.2023.1183691>
- Balarabe, M. A., Alhaji, A. I., Appah, J., Bukar, D. K., & Dogara, U. P. (2025). Biodegradation of chlorpyrifos organophosphorous pesticide using *Aeromonas hydrophila*, isolated from selected agricultural wastewater in Kaduna State. *Science World Journal*, 20(1), 1–8. <https://doi.org/10.4314/swj.v20i1.1>
- Bate, F., Amekan, Y., Pushkin, D. O., Chong, J. P. J., & Bees, M. (2023). Emergent Lag Phase in Flux-Regulation Models of Bacterial Growth. *Bulletin of Mathematical Biology*, 85(9), 1–58. <https://doi.org/10.1007/s11538-023-01189-6>
- Bhatt, P., Chen, S., & Murphy, C. (2023). Editorial: Recent advancements in microbe-pesticide interaction: a smart-soil bioremediation approach. *Frontiers in Microbiology*, 14. <https://doi.org/10.3389/fmicb.2023.1206179>
- Boonupara, T., Udomkun, P., Khan, E., & Kajitvichyanukul, P. (2023). Airborne Pesticides from Agricultural Practices: A Critical Review of Pathways, Influencing Factors, and Human Health Implications. *Toxics*, 11(10). <https://doi.org/10.3390/toxics11100858>
- Bose, S., Kumar, P. S., & Vo, D.-V. N. (2021). A review on the microbial degradation of chlorpyrifos and its metabolite TCP. *Chemosphere*, 283, 131447. <https://doi.org/10.1016/j.chemosphere.2021.131447>
- Bouteh, E., Ahmadi, N., Abbasi, M., Torabian, A., Loosdrecht, M. C. M. Van, & Ducoste, J. (2021). Biodegradation of Organophosphorus Pesticides in Moving Bed Biofilm Reactors: Analysis of Microbial Community and Biodegradation Pathways. *Journal of Hazardous Materials*, 408(October 2020), 124950. <https://doi.org/10.1016/j.jhazmat.2020.124950>
- Briceño, G., Fuentes, M. S., Palma, G., Jorquera, M. A., Amoroso, M. J., & Diez, M. C. (2012). Chlorpyrifos biodegradation and 3,5,6-trichloro-2-pyridinol production by actinobacteria isolated from soil. *International Biodeterioration and Biodegradation*, 73, 1–7. <https://doi.org/10.1016/j.ibiod.2012.06.002>
- Brinco, J., Guedes, P., Gomes da Silva, M., Mateus, E. P., & Ribeiro, A. B. (2023). Analysis of pesticide residues in soil: A review and comparison of methodologies. *Microchemical Journal*, 195. [10.1016/j.microc.2023.109465](https://doi.org/10.1016/j.microc.2023.109465)

- Carlson, H. K., Price, M. N., Callaghan, M., Aaring, A., Chakraborty, R., Liu, H., Kuehl, J. V., Arkin, A. P., & Deutschbauer, A. M. (2019). The selective pressures on the microbial community in a metal-contaminated aquifer. *ISME Journal*, 13(4), 937–949. <https://doi.org/10.1038/s41396-018-0328-1>
- Čadež, T., Kolić, D., Šinko, G., Katalinić, M., Kovarik, Z., & Vrčec, V. (2021). Assessment of Four Organophosphorus Pesticides as Inhibitors of Human Acetylcholinesterase and Butyrylcholinesterase. *Scientific Reports*, 11, 21486. <https://doi.org/10.1038/s41598-021-00953-9>
- Chuan, W., Lingyu, F., Yu, C., Qian, W., Weijia, Z., Jiaqi, F., Yi, C., & Dairong, Q. (2016). An effective methidathion-degrading bacterial strain and its degrading condition optimization with the response surface method. *Chinese Journal of Applied and Environmental Biology*, 22(2), 224–229. <https://doi.org/10.3724/SP.J.1145.2015.05020>
- Dash, D. M., & Osborne, W. J. (2020). Rapid biodegradation and biofilm-mediated bioremoval of organophosphorus pesticides using an indigenous *Kosakonia oryzae* strain -VITPSCQ3 in a Vertical-flow Packed Bed Biofilm Bioreactor. *Ecotoxicology and Environmental Safety*, 192(January), 110290. <https://doi.org/10.1016/j.ecoenv.2020.110290>
- de Souza, R. M., Seibert, D., Quesada, H. B., de Jesus Bassetti, F., Fagundes-Klen, M. R., & Bergamasco, R. (2020). Occurrence, impacts and general aspects of pesticides in surface water: A review. *Process Safety and Environmental Protection*, 135, 22–37. <https://doi.org/10.1016/j.psep.2019.12.035>
- Dhakal, G., Thapa Magar, S., & Fujino, T. (2025). Pesticide Degradation by Soil Bacteria: Mechanisms, Bioremediation Strategies, and Implications for Sustainable Agriculture. *Environments - MDPI*, 12(12), 1–31. <https://doi.org/10.3390/environments12120492>
- Di Martino, P. (2018). Extracellular polymeric substances, a key element in understanding biofilm phenotype. *AIMS Microbiology*, 4(2), 274–288. <https://doi.org/10.3934/MICROBIOL.2018.2.274>
- Diaz-Mateus, M. A., Salgar-Chaparro, S. J., Tarazona, J., & Farhat, H. (2024). Exploring the influence of deposit mineral composition on biofilm communities in oil and gas systems. *Frontiers in Microbiology*, 15(July), 1–14. <https://doi.org/10.3389/fmicb.2024.1438806>
- Elgamoudi, B. A., & Korolik, V. (2023). A Guideline for Assessment and Characterization of Bacterial Biofilm Formation in the Presence of Inhibitory Compounds. *Bio-Protocol*, 13(21), 1–9. doi.org/10.21769/BioProtoc.4866
- Erickson, H. P. (2021). How Teichoic Acids Could Support a Periplasm in Gram-Positive Bacteria, and Let Cell Division Cheat Turgor Pressure. *Frontiers in Microbiology*, 12(May), 1–11. <https://doi.org/10.3389/fmicb.2021.664704>

- Ewida, A. Y. I., El-Sesy, M.E., El-Aswar, E.I., & ElSayed, E. E. (2023). Biodegradation of malathion and chlorpyrifos by some microorganisms isolated from agricultural drainage water in Egypt. *Water Science*, 37(1), 426–438. <https://doi.org/10.1080/23570008.2023.2283665>
- Faggiano, A., Motta, O., Ricciardi, M., Cerrato, F., Garcia Junior, C. A., Fiorentino, A., & Proto, A. (2023). Integrated Anaerobic–Aerobic Moving Bed Biofilm Reactor and Biochar Adsorption for the Efficient Removal of Organic Matter and Nutrients from Brazilian Landfill Leachate. *Sustainability (Switzerland)*, 15(18). <https://doi.org/10.3390/su151813914>
- Farhan, M., Ahmad, M., Kanwal, A., Butt, Z. A., Khan, Q. F., Raza, S. A., Qayyum, H., & Wahid, A. (2021). Biodegradation of chlorpyrifos using isolates from contaminated agricultural soil, its kinetic studies. *Scientific Reports*, 11(1), 1–14. <https://doi.org/10.1038/s41598-021-88264-x>
- Febria, F. A., Zulkhairia, F., Walpajri, F., Putra, A., & Syukriani, L. (2023). Biofilm-Forming Heavy Metal Resistance Bacteria From Bungus Ocean Fisheries Port (PPS) West Sumatra as a Waters Bioremediation Agent. *Pakistan Journal of Biological Sciences*, 26(4), 168–176. <https://doi.org/10.3923/pjbs.2023.168.176>
- Fernandes, M., Salvador, A., Alves, M. M., & Vicente, A. A. (2020). Factors affecting polyhydroxyalkanoates biodegradation in soil. *Polymer Degradation and Stability*, 182, 109408. doi.org/10.1016/j.polymdegradstab.2020.109408
- Fidiastuti, H. R., & Suarsini, E. (2017). Potensi Bakteri Indigen Dalam Mendegradasi Limbah Cair Pabrik Kulit Secara In Vitro. *Bioeksperimen*, 3(1), 1–10. <https://journals.ums.ac.id/bioeksperimen/article/view/3665>
- Food and Agriculture Organization of the United Nations. (2023). Pesticides Use and Trade 1990-2023. In *Faostat Analytical Brief 70* (Vol. 109). <https://doi.org/10.4060/cd5968en>
- Freeman, D. J., Falkiner, F. R., & Keane, C. T. (1989). New method for detecting slime production by coagulase-negative staphylococci. *Journal of Clinical Pathology*, 42, 872–874. <https://doi.org/10.1136/jcp.42.8.872>
- Garde, S., Chodiseti, P. K., & Reddy, M. (2021). Peptidoglycan: Structure, Synthesis, and Regulation. *EcoSal Plus*, 9(2). <https://doi.org/10.1128/ecosalplus.esp-0010-2020>
- Gautam, A., Lear, G., & Lewis, G. D. (2022). Time after time: detecting annual patterns in stream bacterial biofilm communities. *Environmental Microbiology*, 24(5), 2502–2515. <https://doi.org/10.1111/1462-2920.16017>
- Gauthier, M. J., Berge, J. B., Cuany, A., Breittmayer, V., & Fournier, D. (1988). Microbial degradation of methidathion in natural environments and metabolization of this pesticide by *Bacillus coagulans*. *Pesticide Biochemistry and Physiology*, 31(1), 61–66. [https://doi.org/10.1016/0048-3575\(88\)90029-6](https://doi.org/10.1016/0048-3575(88)90029-6)

- Geissen, V., Silva, V., Lwanga, E. H., Beriot, N., Oostindie, K., Bin, Z., Pyne, E., Busink, S., Zomer, P., Mol, H., & Ritsema, C. J. (2021). Cocktails of pesticide residues in conventional and organic farming systems in Europe – Legacy of the past and turning point for the future. *Environmental Pollution*, 278, 116827. <https://doi.org/10.1016/j.envpol.2021.116827>
- Gonzalez, J. M., & Aranda, B. (2023). Microbial Growth under Limiting Conditions-Future Perspectives. *Microorganisms*, 11(7), 1–21. <https://doi.org/10.3390/microorganisms11071641>
- Guerrero Ramírez, J. R., Ibarra Muñoz, L. A., Balagurusamy, N., Frías Ramírez, J. E., Alfaro Hernández, L., & Carrillo Campos, J. (2023). Microbiology and Biochemistry of Pesticides Biodegradation. *International Journal of Molecular Sciences*, 24(21). <https://doi.org/10.3390/ijms242115969>
- Halim, R. M. A., Kassem, N. N., & Mahmoud, B. S. (2018). Detection of biofilm producing staphylococci among different clinical isolates and its relation to methicillin susceptibility. *Open Access Macedonian Journal of Medical Sciences*, 6(8), 1335–1341. <https://doi.org/10.3889/oamjms.2018.246>
- Harika, K., Shenoy, V., Narasimhaswamy, N., & Chawla, K. (2020). Detection of biofilm production and its impact on antibiotic resistance profile of bacterial isolates from chronic wound infections. *Journal of Global Infectious Diseases*, 12(3), 129–134. https://doi.org/10.4103/jgid.jgid_150_19
- Hasan, H. A., Rahim, N. F. M., Alias, J., Ahmad, J., Said, N. S. M., Ramli, N. N., Buhari, J., Abdullah, S. R. S., Othman, A. R., Jusoh, H. H. W., Juahir, H., & Kurniawan, S. B. (2024). A Review on the Roles of Extracellular Polymeric Substances (EPSs) in Wastewater Treatment: Source, Mechanism Study, Bioproducts, Limitations, and Future Challenges. *Water*, 16(19), 2812. <https://doi.org/10.3390/w16192812>
- Hossain, M. F., Akter, M. A., Sohan, M. S. R., Sultana, D. N., Reza, M. A., & Hoque, K. M. F. (2022). Bioremediation potential of hydrocarbon degrading bacteria: isolation, characterization, and assessment. *Saudi Journal of Biological Sciences*, 29(1), 211–216. doi.org/10.1016/j.sjbs.2021.08.069
- Hosseini, N., Chehreghani, M., Moineau, S., & Charette, S. J. (2024). Centroid of the bacterial growth curves: a metric to assess phage efficiency. *Communications Biology*, 7(1), 1–9. <https://doi.org/10.1038/s42003-024-06379-z>
- Hua, Y., & Liu, G. (2024). Food Pesticide Residues Monitoring and Health Risk Assessment. *Foods*, 13(3), 1–5. <https://doi.org/10.3390/foods13030474>
- Huang, L., Jin, Y., Zhou, D., Liu, L., Huang, S., Zhao, Y., & Chen, Y. (2022). A Review of the Role of Extracellular Polymeric Substances (EPS) in Wastewater Treatment Systems. *International Journal of Environmental Research and Public Health*, 19(19). <https://doi.org/10.3390/ijerph191912191>

- Huang, Y., Zhang, W., Pang, S., Chen, J., Bhatt, P., Mishra, S., & Chen, S. (2021). Insights into the microbial degradation and catalytic mechanisms of chlorpyrifos. *Environmental Research*, 194(December 2020), 110660. <https://doi.org/10.1016/j.envres.2020.110660>
- Ibrahim, I., & Sillehu, S. (2022). Identifikasi Aktivitas Penggunaan Pestisida Kimia yang Berisiko pada Kesehatan Petani Hortikultura. *JUMANTIK (Jurnal Ilmiah Penelitian Kesehatan)*, 7(1), 7. <https://doi.org/10.30829/jumantik.v7i1.10332>
- Jirasarnporn, A., Jantharadej, K., Wongwailikhit, K., Chawengkijwanich, C., Lohwatcharin, J., & Suwannasilp, B. B. (2022). A pilot-scale anaerobic moving-bed biofilm reactor with PVA gel beads as media for the treatment of fish canning industry wastewater. *Water Reuse*, 12(2), 206–222. <https://doi.org/10.2166/wrd.2022.090>
- Kebede, G., Tafese, T., Abda, E. M., Kamaraj, M., & Assefa, F. (2021). Factors Influencing the Bacterial Bioremediation of Hydrocarbon Contaminants in the Soil: Mechanisms and Impacts. *Journal of Chemistry*, 2021. <https://doi.org/10.1155/2021/9823362>
- Khurshid, C., Silva, V., Gai, L., Osman, R., Mol, H., Alaoui, A., Christ, F., Schlünssen, V., Vested, A., Abrantes, N., Campos, I., Baldi, I., Robelot, E., Bureau, M., Pasković, I., Polić Pasković, M., Glavan, M., Hofman, J., Harkes, P., ... Geissen, V. (2024). Pesticide residues in European sediments: A significant concern for the aquatic systems? *Environmental Research*, 261(August). <https://doi.org/10.1016/j.envres.2024.119754>
- Kilonzi, J. M., & Otieno, S. (2024). Degradation kinetics and physiological studies of organophosphates degrading microorganisms for soil bioremediation. *Stress Biology*, 4(1). <https://doi.org/10.1007/s44154-023-00138-6>
- Kim, K. H., Kim, S. H., & Her, C. (2017). Methidathion Poisoning. *Korean Journal of Critical Care Medicine*, 32(4), 363–369. [10.4266/kjccm.2016.00073](https://doi.org/10.4266/kjccm.2016.00073)
- Kim, Y. K., Baek, E. J., Na, T. W., Sim, K. S., Kim, H., & Kim, H. J. (2024). LC-MS/MS and GC-MS/MS Cross-Checking Analysis Method for 426 Pesticide Residues in Agricultural Products: A Method Validation and Measurement of Uncertainty. *Journal of Agricultural and Food Chemistry*. <https://doi.org/10.1021/acs.jafc.4c01992>
- Krishnamurthi, V. R., Niyonshuti, I. I., Chen, J., & Wang, Y. (2021). A new analysis method for evaluating bacterial growth with microplate readers. *PLoS ONE*, 16(1 January), 1–19. <https://doi.org/10.1371/journal.pone.0245205>
- Książek-Trela, P., Potocki, L., & Szpyrka, E. (2025). The impact of novel bacterial strains and their consortium on diflufenican degradation in the mineral medium and soil. *Scientific Reports*, 15(1), 1–13. <https://doi.org/10.1038/s41598-025-02696-3>

- Kumar, A., Solanki, M. K., Kumar, M., Kaushik, A., Arya, A., Saikia, M., Gaur, V. K., Singh, R. P., Singh, S. K., Singh, V. K., & Dufossé, L. (2026). The microbial strategies for the management of chemical pesticides: A comprehensive review. *Current Research in Microbial Sciences*, 10(November 2025). <https://doi.org/10.1016/j.crmicr.2025.100519>
- Kumar, G., Lal, S., Soni, S. K., Maurya, S. K., Shukla, P. K., Chaudhary, P., Bhattacharjee, A. K., & Garg, N. (2022). Mechanism and kinetics of chlorpyrifos co-metabolism by using environment restoring microbes isolated from rhizosphere of horticultural crops under subtropics. *Frontiers in Microbiology*, 13(July), 1–16. <https://doi.org/10.3389/fmicb.2022.891870>
- Kumar, S., Kaushik, G., Dar, M. A., Nimesh, S., López-Chuken, U. J., & Villarreal-Chiu, J. F. (2018). Microbial Degradation of Organophosphate Pesticides: A Review. *Pedosphere*, 28(2), 190–208. [https://doi.org/10.1016/S1002-0160\(18\)60017-7](https://doi.org/10.1016/S1002-0160(18)60017-7)
- Lerch, T. Z., Chenu, C., Dignac, M. F., Barriuso, E., & Mariotti, A. (2017). Biofilm vs. Planktonic Lifestyle: Consequences for Pesticide 2,4-D Metabolism by *Cupriavidus necator* JMP134. *Frontiers in Microbiology*, 8(MAY), 1–11. <https://doi.org/10.3389/fmicb.2017.00904>
- Liaqat, I., Khalid, A., Rubab, S., Rashid, F., Latif, A. A., Naseem, S., Bibi, A., Khan, B. N., Ansar, W., Javed, A., Afzaal, M., Summer, M., Majid, S., Ali, S., & Aftab, M. N. (2023). In Vitro Biofilm-Mediated Biodegradation of Pesticides and Dye-Contaminated Effluents Using Bacterial Biofilms. *Microorganisms*, 11(9). <https://doi.org/10.3390/microorganisms11092163>
- Madbolly, W. N., Abdelall, M. F., Zaki, S. S., Nour El-Din, H. A., Fahd, M. I., & Abdallah, S. A. (2022). Biodegradation of Organophosphorus Pesticide (Malathion) by *Bacillus* sp. FYM31 Isolated from Agriculture Drainage Water. *Journal of Scientific Research in Science*, 39(2), 148–164. <https://doi.org/10.21608/jsrs.2022.275794>
- Mali, H., Shah, C., Patel, D. H., Trivedi, U., & Subramanian, R. B. (2022). Degradation insight of organophosphate pesticide chlorpyrifos through novel intermediate 2,6-dihydroxypyridine by *Arthrobacter* sp. HM01. *Bioresources and Bioprocessing*, 9(1). <https://doi.org/10.1186/s40643-022-00515-5>
- Malla, M. A., Dubey, A., Kumar, A., Yadav, S., & Kumari, S. (2023). Modeling and optimization of chlorpyrifos and glyphosate biodegradation using RSM and ANN: Elucidating their degradation pathways by GC-MS based metabolomics. *Ecotoxicology and Environmental Safety*, 252(October 2022), 114628. <https://doi.org/10.1016/j.ecoenv.2023.114628>
- Malla, M. A., Dubey, A., Raj, A., Kumar, A., Upadhyay, N., & Yadav, S. (2022). Emerging frontiers in microbe-mediated pesticide remediation: Unveiling role of omics and In silico approaches in engineered environment. *Environmental Pollution*, 299(January). <https://doi.org/10.1016/j.envpol.2022.118851>

- Manalu, R. S, Rahmadhani, C. P., Susilawarni, M., Lubis, D. F., & Rahmadi, M. T. (2025). Danau Singkarak sebagai Motor Ekonomi Lokal: Analisis Peran Desa Wisata dalam Peningkatan Pendapatan Masyarakat Lokal. *Jurnal Ekonomi, Manajemen Pariwisata Dan Perhotelan* 4(2), 538-553, <https://doi.org/10.55606/jempper.v4i2.4572>
- Martín-Rodríguez, A. J., Villion, K., Yilmaz-Turan, S., Vilaplana, F., Sjöling, Å., & Römling, U. (2021). Regulation of colony morphology and biofilm formation in *Shewanella* algae. *Microbial Biotechnology*, 14(3), 1183–1200. <https://doi.org/10.1111/1751-7915.13788>
- Nanhah, V. J. K., Ntepe, L. J. M., Tchuenté, B. R. T., Hagbe, P. V., Goda, D., Ekedjoum, Y. D. E., Ella, F. A., Nguemto, G. R. T., Mandob, D. E., & Ngondi, J. L. (2025). Neurological and organ health risks associated with pesticide mixture exposure in banana farm workers in Moungo Division, Cameroon. *Scientific Reports*, 15(1), 1–9. <https://doi.org/10.1038/s41598-025-04295-8>
- Ortiz-Hernández, M. L., & Sánchez-Salinas, E. (2010). Biodegradation of the organophosphate pesticide tetrachlorvinphos by bacteria isolated from agricultural soils in Mexico. *Revista Internacional de Contaminacion Ambiental*, 26(1), 27–38. www.scielo.org.mx/pdf/rica/v26n1/v26n1a3.pdf
- Pandolfo, E., Durán-Wendt, D., Martínez-Cuesta, R., Montoya, M., Carrera-Ruiz, L., Vazquez-Arias, D., Blanco-Romero, E., Garrido-Sanz, D., Redondo-Nieto, M., Martín, M., & Rivilla, R. (2024). Metagenomic analyses of a consortium for the bioremediation of hydrocarbons polluted soils. *AMB Express*, 14(1). <https://doi.org/10.1186/s13568-024-01764-7>
- Paray, A. A., Singh, M., & Amin Mir, M. (2023). Gram Staining: A Brief Review. *International Journal of Research and Review*, 10(9), 336–341. <https://doi.org/10.52403/ijrr.20230934>
- Parrilli, E., Tutino, M. L., & Marino, G. (2022). Biofilm as an adaptation strategy to extreme conditions. *Rendiconti Lincei*, 33(3), 527–536. <https://doi.org/10.1007/s12210-022-01083-8>
- Pashirova, T., Salah-Tazdaït, R., Tazdaït, D., & Masson, P. (2024). Applications of Microbial Organophosphate-Degrading Enzymes to Detoxification of Organophosphorous Compounds for Medical Countermeasures against Poisoning and Environmental Remediation. *International Journal of Molecular Sciences*, 25(14). <https://doi.org/10.3390/ijms25147822>
- Pathak, V. M., Verma, V. K., Rawat, B. S., Kaur, B., Babu, N., Sharma, A., Dewali, S., Yadav, M., Kumari, R., Singh, S., Mohapatra, A., Pandey, V., Rana, N., & Cunill, J. M. (2022). Current status of pesticide effects on environment, human health and its eco-friendly management as bioremediation: A comprehensive review. *Frontiers in Microbiology*, 13(August), 1–29. <https://doi.org/10.3389/fmicb.2022.962619>

- Penesyanyan, A., Paulsen, I. T., Kjelleberg, S., & Gillings, M. R. (2021). Three faces of biofilms: a microbial lifestyle, a nascent multicellular organism, and an incubator for diversity. *Npj Biofilms and Microbiomes*, 7(1), 1–9. <https://doi.org/10.1038/s41522-021-00251-2>
- Prabhukhot, G. S., Eggleton, C. D., Kim, M., & Patel, J. (2024). Impact of surface topography and hydrodynamic flow conditions on single and multispecies biofilm formation by *Escherichia coli* O157:H7 and *Listeria monocytogenes* in presence of promotor bacteria. *Lwt*, 201(May), 116240. <https://doi.org/10.1016/j.lwt.2024.116240>
- Pujiati, Prasetyanti, Y. W., Ardhi, M. W., Fatimah, Ramadhan, R., & Ni'matuzahroh. (2025). Isolation and potential test of indigenous bacteria from Singolangu, Magetan, Indonesia for bioremediation of organophosphate compounds. *Biodiversitas*, 26(3), 1029–1038. doi.org/10.13057/biodiv/
- Rather, M. A., Gupta, K., & Mandal, M. (2021). Microbial biofilm: formation, architecture, antibiotic resistance, and control strategies. *Brazilian Journal of Microbiology*, 52(4), 1701–1718. doi.org/10.1007/s42770-021-00624-x
- Rattray, J. B., Lowhorn, R. J., Walden, R., Márquez-Zacarias, P., Molotkova, E., Perron, G., Solis-Lemus, C., Pimentel Alarcon, D., & Brown, S. P. (2023). Machine learning identification of *Pseudomonas aeruginosa* strains from colony image data. *PLoS Computational Biology*, 19(12), 1–21. <https://doi.org/10.1371/journal.pcbi.1011699>
- Ren, X., Zeng, G., Tang, L., Wang, J., Wan, J., Liu, Y., Yu, J., Yi, H., Ye, S., & Deng, R. (2018). Sorption, transport and biodegradation – An insight into bioavailability of persistent organic pollutants in soil. *Science of the Total Environment*, 610–611, 1154–1163. doi.org/10.1016/j.scitotenv.2017.08.089
- Sáhó, A., Karikás, V., Ásványi, B., Lakatos, E., Varga, L., & Greff, B. (2024). Bioactive Potential of Actinobacteria Strains Isolated from the Rhizosphere of Lavender, Lemon Balm, and Oregano. *Agriculture (Switzerland)*, 14(10), 1–16. <https://doi.org/10.3390/agriculture14101758>
- Saini, S., Tewari, S., Dwivedi, J., & Sharma, V. (2023). Biofilm-mediated wastewater treatment: a comprehensive review. *Materials Advances*, 4(6), 1415–1443. <https://doi.org/10.1039/d2ma00945e>
- Sánchez-Clemente, R., Guijo, M. I., Nogales, J., & Blasco, R. (2020). Carbon source influence on extracellular pH changes along bacterial cell-growth. *Genes*, 11(11), 1–17. <https://doi.org/10.3390/genes11111292>
- Sekar, S., Mahadevan, S., Kumar, S. S. D., & Mandal, A. B. (2011). Thermokinetic responses of the metabolic activity of *Staphylococcus lentus* cultivated in a glucose limited mineral salt medium. *Journal of Thermal Analysis and Calorimetry*, 104(1), 149–155. <https://doi.org/10.1007/s10973-010-1121-1>

- Shah, B. A., Malhotra, H., Papade, S. E., Dhamale, T., Ingale, O. P., Kasarlawar, S. T., & Phale, P. S. (2024). Microbial degradation of contaminants of emerging concern: metabolic, genetic and omics insights for enhanced bioremediation. *Frontiers in Bioengineering and Biotechnology*, 12(September), 1–36. <https://doi.org/10.3389/fbioe.2024.1470522>
- Sharma, A., Kumar, V., Shahzad, B., Tanveer, M., Sidhu, G. P. S., Handa, N., Kohli, S. K., Yadav, P., Bali, A. S., Parihar, R. D., Dar, O. I., Singh, K., Jasrotia, S., Bakshi, P., Ramakrishnan, M., Kumar, S., Bhardwaj, R., & Thukral, A. K. (2019). Worldwide pesticide usage and its impacts on ecosystem. *SN Applied Sciences*, 1(11), 1–16. <https://doi.org/10.1007/s42452-019-1485-1>
- Sharma, S., Mohler, J., Mahajan, S. D., Schwartz, S. A., Bruggemann, L., & Aalinkel, R. (2024). Correction to: Microbial Biofilm: A Review on Formation, Infection, Antibiotic Resistance, Control Measures, and Innovative Treatment (Microorganisms, (2023), 11, 6, (1614), 10.3390/microorganisms11061614). *Microorganisms*, 12(10), 1–33. <https://doi.org/10.3390/microorganisms12101961>
- Shekhar, C., Khosya, R., Thakur, K., Mahajan, D., Kumar, R., Kumar, S., & Sharma, A. K. (2024). A systematic review of pesticide exposure, associated risks, and long-term human health impacts. *Toxicology Reports*, 13(October), 101840. <https://doi.org/10.1016/j.toxrep.2024.101840>
- Shi, T., Fang, L., Qin, H., Chen, Y., Wu, X., & Hua, R. (2019). Rapid biodegradation of the organophosphorus insecticide chlorpyrifos by cupriavidus nantongensis x1T. *International Journal of Environmental Research and Public Health*, 16(23). <https://doi.org/10.3390/ijerph16234593>
- Sinambela, B. R. (2024). Dampak Penggunaan Pestisida Dalam Kegiatan Pertanian Terhadap Lingkungan Hidup Dan Kesehatan. *AGROTEK: Jurnal Ilmiah Ilmu Pertanian*, 8(1), 76–85. <https://doi.org/10.33096/agrotek.v8i1.478>
- Sivanantha, J., Sai Durga, C., & Suriya, S. G. (2024). A Review on Environmental Impact of Pesticide Usage and Its Agronomic Management Strategies. *Trends In Agriculture Science*, February. <https://doi.org/10.5281/zenodo.10551188>
- Srinivasan, K., & Mahadevan, R. (2010). Characterization of proton production and consumption associated with microbial metabolism. *BMC Biotechnology*, 10. <https://doi.org/10.1186/1472-6750-10-2>
- Sun, Q., Dong, Y., Wen, X., Zhang, X., Hou, S., Zhao, W., & Yin, D. (2023). A review on recent advances in mass spectrometry analysis of harmful contaminants in food. *Frontiers in Nutrition*, 10(August), 1–16. <https://doi.org/10.3389/fnut.2023.1244459>
- Syawal, M. S., Ibrahim, A., Yustiwati, Nasution, S. H., Taufik, I., Saraswati, M., & Ardiwinata, A. N. (2023). Organophosphate pesticide residues in surface water and bilih fish (*Mystacoleucus padangensis* Blkr.) in Lake Singkarak,

- West Sumatra. *IOP Conference Series: Earth and Environmental Science*, 1221(1). <https://doi.org/10.1088/1755-1315/1221/1/012080>
- Thomas, L., Ram, H., & Singh, V. P. (2018). Inducible cellulase production from an organic solvent tolerant *Bacillus* sp. SV1 and evolutionary divergence of endoglucanase in different species of the genus *Bacillus*. *Brazilian Journal of Microbiology*, 49(2), 429–442. <https://doi.org/10.1016/j.bjm.2017.05.010>
- Ughy, B., Nagypati, S., Lajko, D. B., Letoha, T., Prohaszka, A., Deeb, D., Der, A., Pettko-Szandtner, A., & Szilak, L. (2023). Reconsidering Dogmas about the Growth of Bacterial Populations. *Cells*, 12(10). [10.3390/cells12101430](https://doi.org/10.3390/cells12101430)
- Wan, N. F., Fu, L., Dainese, M., Kiær, L. P., Hu, Y. Q., Xin, F., Goulson, D., Woodcock, B. A., Vanbergen, A. J., Spurgeon, D. J., Shen, S., & Scherber, C. (2025). Pesticides have negative effects on non-target organisms. *Nature Communications*, 16(1), 1–16. <https://doi.org/10.1038/s41467-025-56732-x>
- Wang, G., Cui, C., Wang, Y., Pang, J., Yang, S., Wu, C., Fang, R., Zhang, L., Ren, N., & Ding, J. (2024). Enhancement of the anaerobic biodegradation efficiency of azo dye by anthraquinone-loaded biochar biofilm: factors affecting biofilm formation and the enhancement mechanism. *Biochar*, 6(1). <https://doi.org/10.1007/s42773-024-00384-5>
- Wepukhulu, M. N., Wachira, P. M., Oshule, P. S., & Essuman, S. (2024). Developing Specialized Bacterial Consortia for Enhanced Biodegradation of chlorpyrifos in Dairy Farms in Nakuru County. *Journal of Agricultural Science*, 16(9), 77. <https://doi.org/10.5539/jas.v16n9p77>
- Willdigg, J. R., & Helmann, J. D. (2021). Mini Review: Bacterial Membrane Composition and Its Modulation in Response to Stress. *Frontiers in Molecular Biosciences*, 8(May), 1–11. <https://doi.org/10.3389/fmolb.2021.634438>
- Wong, J. Y., Ngieng, N. S., Husaini, A., Saat, R., & Hussain, H. (2025). Influence of pH on the biodegradation efficiency of fats, oils, and grease by biosurfactant-producing bacterial consortia. *Biodegradation*, 36(4), 1–17. <https://doi.org/10.1007/s10532-025-10146-0>
- Xu, X., & Jiang, J. (2024). Engineering microbiomes for enhanced bioremediation. *PLoS Biology*, 22(12), 1–5. <https://doi.org/10.1371/journal.pbio.3002951>
- Yamagishi, Y., Nagasawa, S., Iwase, H., & Ogra, Y. (2022). Post-mortem Interaction Between methidathion and Human Serum Albumin in Blood. *The Journal of toxicological sciences*, 47(4), 139–146. <https://doi.org/10.2131/jts.47.139>
- Yanti, Y., Hamid, H., Yaherwandi, & Nurbailis. (2022). Konsorsium *Bacillus* spp. untuk pengendalian penyakit rebah kecambah dan busuk batang (*Sclerotium rolfsii*) pada tanaman cabai. *Jurnal Agro*, 9(2), 208–218. <https://doi.org/10.15575/17954>

- Zhao, A., Sun, J., & Liu, Y. (2023). Understanding bacterial biofilms: From definition to treatment strategies. *Frontiers in Cellular and Infection Microbiology*, 13(April), 1–23. <https://doi.org/10.3389/fcimb.2023.1137947>
- Zhou, W., Li, M., & Achal, V. (2025). A comprehensive review on environmental and human health impacts of chemical pesticide usage. *Emerging Contaminants*, 11(1), 100410. <https://doi.org/10.1016/j.emcon.2024.100410>

