REFERENCES

Acquista, N., Schoen, L. J., and Lide, D. R., 1968, Infrared spectrum of the matrix-isolated OH radical, *J.Chem.Phys.*, 48(4), 1534–1536.

Ahmed, M., Inoue, K. ichi, Nihonyanagi, S., and Tahara, T., 2020, Hidden Isolated OH at the Charged Hydrophobic Interface Revealed by Two-Dimensional Heterodyne-Detected VSFG Spectroscopy. *Angewandte Chemie - International Edition*, 59(24), 9498–9505.

Akpor, O. B., Odesola, D.E., Thomas, R.E., and Oluba, O.M., 2018, Chicken feather hydrolysate as alternative peptone source for microbial cultivation, *F1000Research*, 7,1918.

Alfen, N.K.V., 2014, *Encyclopedia of Agriculture and Food System*, Academic Press, Cambridge.

Ali, A., Chiang, Y. W., and Santos, R. M., 2022, X-Ray Diffraction Techniques for Mineral Characterization: A Review for Engineers of the Fundamentals, Applications, and Research Directions, *Minerals*, 12(2).

Atrak, K., Ramazani, A., and Taghavi Fardood, S., 2018, Green synthesis of amorphous and gamma aluminum oxide nanoparticles by tragacanth gel and comparison of their photocatalytic activity for the degradation of organic dyes. *Journal of Materials Science: Materials in Electronics*, 29(10), 8347–8353.

Ayutthaya, S. I.N., and Wootthikanokkhan, J., 2013, Extraction of keratin from chicken feather and electrospinning of the keratin/PLA blends, *Adv. Mat.Res.*, 747, 711–714.

Bhari, R., Kaur, M., and Sarup Singh, R., 2021, Chicken Feather Waste Hydrolysate as a Superior Biofertilizer in Agroindustry, *Curr. Microbiol*., 78(6), 2212-2230.

Boguta, P. dan Sokolowska, Z., 2013, Interactions of humic acids with metals, Acta Agrophysica. Monogr., 2, .

Bot, A., and Benites, J., 2005, *The Importance of Soil Organic Matter*, FAO, Rome

Eriska, H., Dewi, K., Darmawan Pasek, A., and Damanhuri, E., 2016, Hydrothermal Carbonization of Biomass Waste by Using a Stirred Reactor: An Initial Experimental Results, *REAKTOR*, *16*(4), 212.

Fagbemi, O. D., and Sithole, B., 2021, Evaluation of waste chicken feather protein hydrolysate as a bio-based binder for particleboard production, *CRGSC*, 4.

FAO , 2009, Feeding the world in 2050, World agricultural summit on food security 16–18 November 2009, Food and Agriculture Organization of the United Nations, Rome

FAO, 2017, 2050 : A Third more mouth to feed

García, A.C., 2012, Humic acids of vermicompost as an ecological pathway to increase resistance of rice seedlings to water stress, *Afr. J. Biotechnol.*, 11(13), 3125-3134.

Gautam, R. K., Navaratna, D., Muthukumaran, S., Singh, A., Islamuddin, and Nandkishor., 2021, Humic Substances: Its Toxicology, Chemistry and Biology Associated with Soil, Plants and Environment, *Intechopen.*

Giri, C., Defourny, P., and Shrestha, S., 2003, Land cover characterization and mapping of continental Southeast Asia using multi-resolution satellite sensor data, *Int. J. Remote Sens.*, *24*(21), 4181–4196.

Goldberg, S., 1989, Interaction of aluminum and iron oxides and clay minerals and their effect on soil physical properties, *Commun. In Soil Sci. Plant Anal.*, 20(11412) , 1181-1207

Greenwold, M. J., Bao, W., Jarvis, E. D., Hu, H., Li, C., Gilbert, M. T. P., Zhang, G., and Sawyer, R. H., 2014, Dynamic evolution of the alpha (α) and beta (β) keratins has accompanied integument diversification and the adaptation of birds into novel lifestyles, *BMC Evol. Biol.*, 14(1).

Guo, P., Qi, Y. P., Huang, W. L., Yang, L. T., Huang, Z. R., Lai, N. W., and Chen, L. S., 2018, Aluminum-responsive genes revealed by RNA-Seq and related physiological responses in leaves of two Citrus species with contrasting aluminum-tolerance, *Ecotoxicology and Environmental Safety*, *158*, 213–222.

Gupta, N. V., and Shivakumar, H. G., 2012, Investigation of Swelling Behavior and Mechanical Properties of a pH-Sensitive Superporous Hydrogel Composite, *IJPR.*, 11(2), 481-493.

Hepler, P. K., Vidali, L., and Cheung, A. Y., 2001, Polarized Cell Growth In Higher Plants, *Annu. Rev. Cell Dev. Biol.*, 17, 159-187.

Hiradate, S., 2004, Speciation of aluminum in soil environments: Application of NMR technique, *Soil Sci. Plant Nutr.*, 50(3), 303–314.

Ivanov, A., Leese, R., and Spieser, A., 2015, Micro-electrochemical Machining. In *Micromanufacturing Engineering and Technology: Second Edition* , Elsevier Inc., Amsterdam

Kasim, S., Ahmed, O.H., and Majid, N.K.A., 2011, Effectiveness of liquid organic-nitrogen fertilizer in enhancing nutrients uptake and use efficiency in corn (Zea mays), *Afr.J.Biotechnol*., 10(12), 2274-2281.

Khan, M. A., Kim, K. W., Mingzhi, W., Lim, B. K., Lee, W. H., and Lee, J. Y., 2008, Nutrient-impregnated charcoal: An environmentally friendly slow-release fertilizer, *Environmentalist*, *28*(3), 231–235.

Kuncaka, A., 2014, Metode memproduksi Pupuk Organik Paramagnetik Pelepasan Lambat (Pupuk Slow Release Organic Paramagnetic/Pupuk SROP), Direktorat Jendral Hak Kekayaan Intelektual, Kementrian Hukum dan Hak Asasi Manusia Republik Indonesia, No. Pendaftaran Paten P00201401530.

Kuncaka, A., Arvianto, R. I., Latifa, A. S. R. B., Rambe, M. R., Suratman, A., and Triono, S., 2021, Analysis and characterization of solid and liquid organic fertilizer from hydrothermal carbonization (Htc) of chicken feather and blood waste, *Indones. J. Chem.*, 21(3), 651–658.

Lasekan, A., Abu Bakar, F., and Hashim, D., 2013, Potential of chicken by-products as sources of useful biological resources, *Waste Manage.*, 33(3), 552–565.

Li, Q., Liu, J., Su, Y., Yue, Q., and Gao, B., 2013, Synthesis and swelling behaviors of semi-IPNs superabsorbent resin based on chicken feather protein. *J.Appl.Polym.Sci.*, *131*(1).

Libohova, Z., Seybold, C., Wysocki, D., Wills, S., Schoeneberger, P., Williams, C., Lindbo, D., Stott, D., and 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, *J. Soil. Water. Conserv.*, 73(4), 411–421.

Madusari, S., 2019, Processing of Fibre and Its Application as Liquid Organic fertilizer in Oil Palm (Elaeis guineensis Jacq.) Seedling for Sustainable Agriculture, *JASAT.*

Maia, C., Almeida, C., Costa, P., Júnior, J., Silveira, G., Peternelli, L., Barbosa, M., and Bhering, L., 2018, Phenotypic Plasticity of Sugarcane Genotypes under Aluminum Stress, *J.Exp.Agric.Int.*, *22*(3), 1–11.

Makhlouf, A.S.H., and Aliofkhazraei, M., 2016, *Handbook of Materials Failure Analysis with Case Studied from the Oil and Gas Industries*, Butterwoth-Heinemann, Oxford.

Mirza, M. A., Ahmad, N., Agarwal, S. P., Mahmood, D., Anwer, M. K., and Iqbal, Z., 2011, Comparative evaluation of humic substances in oral drug delivery, *Results. Pharma Sci.*, *1*(1), 16–26.

Nandiyanto, A. B. D., Oktiani, R., and Ragadhita, R., 2019, How to read and interpret ftir spectroscope of organic material. *IJoST*, *4*(1), 97–118.

Nardi, S., Ertani, A., and Francioso, O., 2017, Soil-root cross-talking: the role of humic substances, *J. Plant Nutr. Soil Sci*. 180, 5–13

Nardi, S., Schiavon, M., and Francioso, O., 2021, Chemical structure and biological activity of humic substances define their role as plant growth promoters, *Molecules* ,26, 2256.

Nhu, N.T.H., Chuen, N.L., and Riddech, N., 2018, The Effects Bio-fertilizer and Liquid Organic Fertilizer on the Growth of Vegetables in the Pot Experiment, *Chiang Mai J. Sci.*, 45(3), 1257-1273.

Njoku, C.E., K. Alaneme, K., A. Omotoyinbo, J., and O. Daramola, M., 2019, Natural Fibers as Viable Sources for the Development of Structural, Semi-Structural, and Technological Materials – A Review, *Adv. Mater. Lett.*, *10*(10), 682–694.

Oosterhuis, D. M., Loka, D. A., Kawakami, E. M., and Pettigrew, W. T., 2014, The physiology of potassium in crop production, *Adv.Agron.*, 126, 203-233.

Paciello, A., and Santonicola, M. G., 2015, Supramolecular polycationic hydrogels with high swelling capacity prepared by partial methacrylation of polyethyleneimine, *RSC Advances*, *5*(108), 88866–88875

Patra, A., Dutta, A., and Chattopadhyay, A., 2020, Toxicity of Aluminium on Plants Physiological and Metabolic Functions, *Food and Scientific Reports*, 1(5), 29-32.

Panda, K.S., Baluška, F., and Matsumoto, H., 2009, Plant Signaling & Behavior Aluminum stress signaling in plants, *Plant Signaling & Behavior*, *4*(7), 592–597.

Pang, W., Hou, D., Wang, H., Sai, S., Wang, B., Ke, J., Wu, G., Li, Q., and Holtzapple, M. T., 2018, Preparation of microcapsules of slow-release NPK compound fertilizer and the release characteristics, *J. Braz. Chem. Soc.*, 29(11), 2397–2404.

Prasasti, D., Juari, S., dan Sudiono, S., 2014, KINETIKA ADSORPSI-REDUKSI ION Au (III) PADA ASAM HUMAT HASIL ISOLASI DARI TANAH GAMBUT RAWA PENING, Pharmaciana, 3, 15–22.

Prashanth, P. A., Raveendra, R. S., Hari Krishna, R., Ananda, S., Bhagya, N. P., Nagabhushana, B. M., Lingaraju, K., and Raja Naika, H., 2015, Synthesis, characterizations, antibacterial and photoluminescence studies of solution combustion-derived α-Al 2 O 3 nanoparticles. *J. Asian Ceram.Soc.*, *3*(3), 345–351.

Pruška, J., and Šedivý, M., 2015, Prediction of Soil Swelling Parameters, *Procedia Earth and Planetary Science*, 15, 219–224.

Rahman, M. A., Lee, S. H., Ji, H. C., Kabir, A. H., Jones, C. S., and Lee, K. W., 2018, Importance of mineral nutrition for mitigating aluminum toxicity in plants on acidic soils: Current status and opportunities, *Int.J.Mol.Sci.*, 19(10),3073

Reddy, S. B., and Dhumgond, P, 2012, Soil Humic and Fulvic Acid Fractions Under Different Land Use Systems Yellow Gypsum as a Source of Sulphur, silicon and other micronutrients in agriculture View project Nutrient Management in vegetable View project, *Madras.Agric.J.*, 99 (7-9), 507-510.

Rout, G. R., and Sahoo, S., 2015, ROLE OF IRON IN PLANT GROWTH AND METABOLISM, *Rev. Agri. Sci.*, *3*(0), 1–24.

Satterthwaite, D., McGranahan, G., and Tacoli, C., 2010, Urbanization and its implication for food and farming, *Phil. Trans. R. Soc. B*, 365, 2809–2820.

Thor, K., 2019, Calcium—nutrient and messenger, *Front.Plant.Sci*., 10.

Uchida, R., 2000, *Plant Nutrient Management in Hawaii's Soils : Approaches for Tropical and Subtropical Agriculture*, College of Tropical Agriculture and Human Resources, Honolulu.

UNCCD, 2015, Indonesia-Land Degradation Neutrality National Report

Waldron, K., 2009, *Handbook of Waste management and co-product recovery in food processing*, Woodhead Publishing, Sawston.

Wang, J., Hao, S., Luo, T., Cheng, Z., Li, W., Gao, F., Guo, T., Gong, Y., and Wang, B., 2017, Feather keratin hydrogel for wound repair: Preparation, healing effect and biocompatibility evaluation, *Colloids Surf.B.*, 149, 341–350.

White, P.J., and Karley, A.J., 2010, *Potassium : Cell Biology of Metals and Nutrients*, Springer, New York City.

Wisnujatia, N. S., and Sangadji, S. S., 2021, Pengelolaan Penggunaan Pestisida Dalam Mendukung Pembangunan Berkelanjutan Di Indonesia, *SEPA*, 18(1), 92.

Wu, S., Li, R., Peng, S., Liu, Q., and Zhu, X., 2017, Effect of humic acid on transformation of soil heavy metals, *IOP Conf. Ser. Mater. Sci. Eng*., 207, 012089

Xu, J., Mohamed, E., Li, Q., Lu, T., Yu, H., and Jiang, W., 2021, Effect of Humic Acid Addition on Buffering Capacity and Nutrient Storage Capacity of Soilless Substrates, *Front. Plant Sci*, *12*.

Yang, F., Tang, C., and Antonietti, M., 2021, Natural and artificial humic substances to manage minerals, ions, water, and soil microorganisms. *Chem. Soc. Rev.* 50, 6221–6239

Yu, H. N., Liu, P., Wang, Z. Y., Chen, W. R., and Xu, G. D., 2011, The effect of aluminum treatments on the root growth and cell ultrastructure of two soybean genotypes, *Crop Protection*, *30*(3), 323–328.

Zorn, C., and Kaminski, N., 2015, Temperature-humidity-bias testing on insulated-gate bipolartransistor modules - failure modes and acceleration due to high voltage, *IET Power Electronics*, 8(12), 2329–2335.