REFERENCES

Amin, F., Asad, S. A., Nazli, Z.-i.-H., Kalsoom, U., Bhatti, H. N., & Bilal, M. 2023. Immobilization, biochemical, thermodynamic, and fruit juice clarification properties of lignocellulosic biomass–derived exo-polygalacturonase from *Penicillium paxilli*. *Biomass Conversion and Biorefinery, 13*(14), 13181-13196. doi:10.1007/s13399-022-02559-1

Amran, F., & Ahmad Zaini, M. A. 2020. Correlations between pore textures of activated carbons and Langmuir constants – case studies on methylene blue and congo red adsorption. *Toxin Reviews, 41*(1), 315-325. doi:10.1080/15569543.2020.1848871

Azizah, Hidayah, A. A., Amelia, R., Wiyono, H. T., Siswoyo, & Muzakhar, K. 2023. Pectinase Production of Aspergillus sp. VTM5 Through Solid State Fermentation Using Coffee Pulp Substrate and Its Purification. In *Proceedings of the 4th International Conference on Life Sciences and Biotechnology (ICOLIB 2021)* (pp. 492-500).

Burgess, R. R., & Deutscher, M. P. 2009. *Guide to protein purification*: Academic Press.

Catalán, E., & Sánchez, A. 2020. Solid-state fermentation (SSF) versus submerged fermentation (SmF) for the recovery of cellulases from coffee husks: a life cycle assessment (LCA) based comparison. *Energies, 13*(11). doi:10.3390/en13112685

Chen, H., Wan, M., Liu, Y., Yang, G., & Cai, Z. 2024. Solid-State Fermentation of Hyperactive Pectinase by the Novel Strain Aspergillus sp. CM96. *Processes, 12*(3). doi:10.3390/pr12030615

Copeland, R. A. 2023. *Enzymes: a practical introduction to structure, mechanism, and data analysis*: John Wiley & Sons.

de Alencar Guimarães, N. C., Glienke, N. N., Contato, A. G., Galeano, R. M. S., Marchetti, C. R., Rosa, M. P. G., de Sa Teles, J. S., de Oliveira Simas, A. L., Zanoelo, F. F., Masui, D. C., & Giannesi, G. C. 2023. Production and biochemical characterization of *Aspergillus japonicus* pectinase using a

low-cost alternative carbon source for application in the clarification of fruit juices. *Waste and Biomass Valorization, 15*(1), 177-186. doi:10.1007/s12649-023-02171-y

Dodds, W. K., & Whiles, M. R. 2020. Chapter 14 - Nitrogen, Sulfur, Phosphorus, and Other Nutrients. In W. K. Dodds & M. R. Whiles (Eds.), *Freshwater Ecology (Third Edition)* (pp. 395-424): Academic Press.

Elzwai, J. I., Alshareef, M. A., & Elbarkoli, E. A. 2018. Fungal biomass production in mycological liquid medium by some ochratoxigenic fungi under static and shake culture conditions. *Journal of Pure & Applied Sciences, 17*(1).

Haile, S., Masi, C., & Tafesse, M. 2022. Isolation and characterization of pectinase-producing bacteria (*Serratia marcescens*) from avocado peel waste for juice clarification. *BMC Microbiol, 22*(1), 145. doi:10.1186/s12866-022-02536-8

Handa, S., Sharma, N., & Pathania, S. 2016. Multiple Parameter Optimization for Maximization of Pectinase Production by Rhizopus sp. C4 under Solid State Fermentation. *Fermentation, 2*(2). doi:10.3390/fermentation2020010

Himmel, M. E. 2008. *Biomass Recalcitrance: Deconstructing the Plant Cell Wall for Bioenergy*: Blackwell Publishing Ltd.

Imtiaj, A., Jayasinghe, C., Lee, G. W., Kim, H. Y., Shim, M. J., Rho, H.-S., Lee, H. S., Hur, H., Lee, M. W., & Lee, U.-Y. 2008. Physicochemical requirement for the vegetative growth of Schizophyllum commune collected from different ecological origins. *Mycobiology, 36*(1), 34-39.

Kanungo, A., & Bag, B. P. 2019. Structural insights into the molecular mechanisms of pectinolytic enzymes. *Journal of Proteins and Proteomics, 10*(4), 325-344. doi:10.1007/s42485-019-00027-5

Kc, S., Upadhyaya, J., Joshi, D. R., Lekhak, B., Kumar Chaudhary, D., Raj Pant, B., Raj Bajgai, T., Dhital, R., Khanal, S., Koirala, N., & Raghavan, V. 2020. Production, characterization, and industrial application of pectinase enzyme isolated from fungal strains. *Fermentation, 6*(2). doi:10.3390/fermentation6020059

Li, W., Zhou, P., & Yu, L. 2011. Statistical optimization of the medium composition by response surface methodology to enhance schizophyllan production by

Schizophyllum commune. *Zeitschrift für Naturforschung C, 66*(3-4), 173-181.

Liu, C., Qin, X., Liu, B., Xu, X., Deng, A., Zhang, Y., Zhang, Z., & Zhang, W. 2022. High-yield production of acidic pectin lyase PNLZJ5B for juice processing. *Lett Appl Microbiol, 75*(4), 1055-1062. doi:10.1111/lam.13781

Liu, X., Zain Ul Arifeen, M., Xue, Y., & Liu, C. 2022. Genome-wide characterization of laccase gene family in *Schizophyllum commune* 20R-7-F01, isolated from deep sediment 2 km below the seafloor. *Front Microbiol, 13*, 923451. doi:10.3389/fmicb.2022.923451

Mat Jalil, M. T., Zakaria, N. A., Salikin, N. H., & Ibrahim, D. 2023. Assessment of cultivation parameters influencing pectinase production by *Aspergillus niger* LFP-1 in submerged fermentation. *J Genet Eng Biotechnol, 21*(1), 45. doi:10.1186/s43141-023-00510-z

Meena, B., Sowmeya, V. G., Praveen, A. B., Swetha, A., Chandra, D. N. S., & Kavitha, M. 2021. Pectin Degradation in Fruit Juices by Pectinase from Meyerozyma sp. VITPCT75 Isolated from Phyllanthus emblica. *Journal of Pure and Applied Microbiology, 15*(2), 926-935. doi:10.22207/jpam.15.2.51

Mehmood, T., Saman, T., Irfan, M., Anwar, F., Ikram, M. S., & Tabassam, Q. 2019. Pectinase production from *Schizophyllum commune* through central composite design using citrus waste and its immobilization for industrial exploitation. *Waste and Biomass Valorization, 10*(9), 2527-2536. doi:10.1007/s12649-018-0279-9

Miller, G. L. 1959. Use of dinitrosalicylic acid reagent for determination of reducing sugar. *Analytical chemistry, 31*(3), 426-428.

Mohammed Kuddus, C. N. A. 2021. *Value-Addition in Food Products and Processing Through Enzyme Technology* Academic Press.

Mwaheb, M. A., El-Aziz, B. M. A., Abd-Elhalim, B. T., El-Kassim, N. A., & Radwan, T. E. E. 2025. Study of Different Cultivated Plants Rhizosphere Soil Fungi-Mediated Pectinase: Insights into Production, Optimization, Purification, Biocompatibility, and Application. *Microbial Ecology, 87*(1), 165. doi:10.1007/s00248-024-02474-0

Nasreen, Z., Khan, S. J., Yasmeen, A., Shafique, M., Usman, S., & Ali, S. 2015. Optimization of Submerged Culture Conditions for Biomass Production in Schizophyllum commune, a Medical Mushroom. *International Journal of Current Microbiology and Applied Sciences, Volume 4 Number 2*.

Nehad E. Ahmed, N., & Rahman, H. M. M. A. E. 2021. Optimizing the production of pectinase of orange peel waste by *Penicillium chrysogenum* Mf318506 using response surface methodology in submerged fermentation. *Journal of Microbiology, Biotechnology and Food Sciences, 11*(1). doi:10.15414/jmbfs.3931

Nemes, S. A., Calinoiu, L. F., Dulf, F. V., Farcas, A. C., & Vodnar, D. C. 2022. Integrated technology for cereal bran valorization: perspectives for a sustainable industrial approach. *Antioxidants (Basel), 11*(11). doi:10.3390/antiox11112159

Nunez-Serrano, A., Garcia-Reyes, R. B., Solis-Pereira, S., & Garcia-Gonzalez, A. 2024. Production and immobilization of pectinases from *Penicillium crustosum* in magnetic core-shell nanostructures for juice clarification. *Int J Biol Macromol, 263*(Pt 1), 130268. doi:10.1016/j.ijbiomac.2024.130268

Patel, V. B., Chatterjee, S., & Dhoble, A. S. 2022. A review on pectinase properties, application in juice clarification, and membranes as immobilization support. *Journal of Food Science, 87*(8), 3338-3354. doi:10.1111/1750-3841.16233

Pavlovic, M., Margetic, A., Leonardi, A., Krizaj, I., Kojic, M., Vujcic, Z., & Sokarda Slavic, M. 2024. Improvement of fruit juice quality: novel endo-polygalacturonase II from *Aspergillus tubingensis* FAT 43 for enhanced liquefaction, clarification, and antioxidant potential. *Food Funct, 15*(6), 2906-2919. doi:10.1039/d3fo05297d

Pavlovic, M., Marinela Sokarda, S., Ristovic, M., Stojanovic, S., Margetic, A., Momcilovic, M., & Vujcic, Z. 2023. Optimization of solid-state fermentation for enhanced production of pectinolytic complex by *Aspergillus tubingensis* FAT43 and its application in fruit juice processing. *Lett Appl Microbiol, 76*(8). doi:10.1093/lambio/ovad083

Robinson, J. R., Isikhuemhen, O. S., & Anike, F. N. 2021. Fungal-Metal Interactions: A Review of Toxicity and Homeostasis. *J Fungi (Basel), 7*(3). doi:10.3390/jof7030225

Sari, S. L. A., Triyanto, T., Zuprizal, Z., & Prijambada, I. D. 2021. Cellulolytic and mannanolytic aerobic bacteria isolated from Buffalo rumen (*Bubalus babalis*) and its potency to degrade fiber in palm kernel meal. *Biodiversitas Journal of Biological Diversity, 22*(7). doi:10.13057/biodiv/d220733

Sharafaddin, A. H., Hamad, Y. K., El_Komy, M. H., Ibrahim, Y. E., Widyawan, A., Molan, Y. Y., & Saleh, A. A. 2019. Cell wall degrading enzymes and their impact on Fusarium proliferatum pathogenicity. *European Journal of Plant Pathology, 155*(3), 871-880. doi:10.1007/s10658-019-01818-8

Shet, A. R., Muhsinah, A. B., Alsayari, A., Achappa, S., Desai, S. V., Mahnashi, M. H., Muddapur, U. M., Shaikh, I. A., Mannasaheb, B. A., & Khan, A. A. 2022. Media optimization by response surface methodology for the enhanced production of acidic extracellular pectinase by the indigenously isolated novel strain *Aspergillus cervinus* ARS2 using solid-state fermentation. *Fermentation, 8*(10). doi:10.3390/fermentation8100485

Shrestha, S., Chio, C., Khatiwada, J. R., Mokale Kognou, A. L., Chen, X., & Qin, W. 2023. Optimization of Cultural Conditions for Pectinase Production by Streptomyces sp. and Characterization of Partially Purified Enzymes. *Microb Physiol, 33*(1), 12-26. doi:10.1159/000528257

Shrestha, S., Rahman, M. S., & Qin, W. 2021. New insights in pectinase production development and industrial applications. *Applied Microbiology and Biotechnology, 105*(24), 9069-9087. doi:10.1007/s00253-021-11705-0

Singh, S., Raj, C., Singh, H. K., Avasthe, R. K., Said, P., Balusamy, A., Sharma, S. K., Lepcha, S. C., & Kerketta, V. 2021. Characterization and development of cultivation technology of wild split gill *Schizophyllum commune* mushroom in India. *Scientia Horticulturae, 289*. doi:10.1016/j.scienta.2021.110399

Suhaimi, H., Dailin, D. J., Malek, R. A., Hanapi, S. Z., Ambehabati, K. K., Keat, H. C., Prakasham, S., Elsayed, E. A., Misson, M., & El Enshasy, H. 2021.

Fungal Pectinases: Production and Applications in Food Industries. In *Fungi in Sustainable Food Production* (pp. 85-115).

Takeyama, M. M., de Carvalho, M. C., Carvalho, H. S., Silva, C. R., Uetanabaro, A. P. T., da Costa, A. M., Evaristo, J. A. M., Nogueira, F. C. S., Fai, A. E. C., & Koblitz, M. G. B. 2022. Pectinases Secretion by Saccharomyces cerevisiae: Optimization in Solid-State Fermentation and Identification by a Shotgun Proteomics Approach. *Molecules, 27*(15). doi:10.3390/molecules27154981

Umeo, S. H., Faria, M. G. I., Dragunski, D. C., Valle, J. S. D., Colauto, N. B., & Linde, G. A. 2020. Iron Or Zinc Bioaccumulated In Mycelial Biomass Of Edible Basidiomycetes. *An Acad Bras Cienc, 92 Suppl 2*, e20191350. doi:10.1590/0001-3765202020191350

Utami, A. P., Fahrurrozi, F., & Meryandini, A. 2022. Production and immobilization pectinase from Bacillus sp. 2P11 using alginate beads. *Biodiversitas Journal of Biological Diversity, 23*(8). doi:10.13057/biodiv/d230813

Wu, Z., Qin, D., Li, H., Guo, D., Cheng, H., Sun, J., Huang, M., Ye, X., & Sun, B. 2022. Physicochemical and functional properties of Lycium ruthenicum pectin by different extraction methods. *Front Nutr, 9*, 946606. doi:10.3389/fnut.2022.946606

Zhang, G., Li, S., Xu, Y., Wang, J., Wang, F., Xin, Y., Shen, Z., Zhang, H., Ma, M., & Liu, H. 2019. Production of alkaline pectinase: a case study investigating the use of tobacco stalk with the newly isolated strain Bacillus tequilensis CAS-MEI-2-33. *BMC Biotechnology, 19*(1), 45. doi:10.1186/s12896-019-0526-6

Zheng, W., Lehmann, A., Ryo, M., Valyi, K. K., & Rillig, M. C. 2020. Growth rate trades off with enzymatic investment in soil filamentous fungi. *Sci Rep, 10*(1), 11013. doi:10.1038/s41598-020-68099-8

Zhu, N., Liu, J., Yang, J., Lin, Y., Yang, Y., Ji, L., Li, M., & Yuan, H. 2016. Comparative analysis of the secretomes of Schizophyllum commune and other wood-decay basidiomycetes during solid-state fermentation reveals its

unique lignocellulose-degrading enzyme system. *Biotechnol Biofuels, 9*, 42. doi:10.1186/s13068-016-0461-x

Zwinkels, J., Wolkers-Rooijackers, J., & Smid, E. J. 2023. Solid-state fungal fermentation transforms low-quality plant-based foods into products with improved protein quality. *Lwt, 184*. doi:10.1016/j.lwt.2023.114979