Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Ahmed, A., Mukhtar, H., Gohar, U., dan Haq, I. (2013). Production of Lovastatin from Aspergillus Terreus Thorugh Submerged Fermentation. Journal of Botany

Al-Saman, M. A., Helmy, M. A., Abdella, A., Wilkins, M. R., El Khalik Gobba, N. A., & Mahrous, H. (2021). Optimization of lovastatin production by Aspergillus terreus ATCC 10020 using solid-state fermentation and its pharmacological applications. Biocatalysis and Agricultural Biotechnology, 31, 101906.

Al-Sa'ady, A. J. R., & Aziz, G. M. (2020). Optimization of Lovastatin Production from A Local Isolate of Aspergillus terreus A50 in Solid State Fermentation by Classical and Statistical Methods. Iraqi Journal of Science, 2525–2539.

Ali, H. Kh. Q., & Zulkali, M. M. D. (2011). ChemInform Abstract: Design Aspects of Bioreactors for Solid-State Fermentation. ChemInform, 42(41), no-no.

Ali, S. E., Yuan, Q., Wang, S., & Farag, M. A. (2021). More than sweet: A phytochemical and pharmacological review of sugarcane (Saccharum officinarum L.). In Food Bioscience (Vol. 44). Elsevier Ltd.

Almeida, M. A., & Colombo, R. (2023). Production Chain of First-Generation Sugarcane Bioethanol: Characterization and Value-Added Application of Wastes. Bioenergy Research, 16(2), 924–939.

Altowayti, W. A. H., Shahir, S., Eisa, T. A. E., Nasser, M., Babar, M. I., Alshalif, A. F., & AL-Towayti, F. A. H. (2022). Smart Modelling of a Sustainable Biological Wastewater Treatment Technologies: A Critical Review. Sustainability, 14(22), 15353. https://doi.org/10.3390/su142215353

American Society Of Mechanical Engineers. Boiler And Pressure Vessel Committee. (2004). ASME boiler and pressure vessel code : an international code. II, Materials. American Soiety Of Mechanical Engineers.

American Type Culture Collection. (n.d). Aspergillus terreus Thom 20542. Diakses pada tanggal 1 November 2025. URL: https://www.atcc.org/products/20542

American. (2007). 2007 ASME Boiler & Pressure Vessel Code: Materials. pt. A. Ferrous material specifications; pt. B. Nonferrous material specifications; pt. C. Specifications for welding rods, electrodes, and filler metals; pt. D-[1]. Properties (customary), pt. D-[2]. Properties (metric).

Amin, N. S., Ma'rifatillah, N. P. N. N., Permatasari, N. I., & Maryam, N. S. (2025). Eksplorasi Kimia Medisinal untuk Terapi Kolesterol Tinggi: Analisis Struktur-Aktivitas dan Target Molekuler Obat. JURNAL RISET RUMPUN ILMU KESEHATAN, 4(1), 109–121.

API. (2008). API 620 : Design and construction of large, welded, low-pressure storage tanks.

Aravindan, R., Viruthagiri, T., Seenivasan, A., & Subhagar, S. (2008). Microbial production and biomedical applications of lovastatin. Indian Journal of Pharmaceutical Sciences, 70(6), 701.

Arief, R. W. dan R.Asnawi. (2009). Kandungan Gizi dan Komposisi Asam Amino Beberapa Varietas Jagung. Jurnal Penelitian Pertanian Terapan 9(2):61-66.

UNIVERSITAS
GADJAH MADA
Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000 ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Arsenyeva, O. P., Tovazhnyansky, L. L., Kapustenko, P. O., & Khavin, G. L. (2011). Optimal design of plate-and-frame heat exchangers for efficient heat recovery in process industries. Energy, 36(8), 4588-4598.

Asih, N., Suarya, P.,. Manuaba, I., dan Wirajana, I. (2018). Hidrolisis Batang Jagung Secara Enzimatik dari Tanah Hutan Mangrove. Cakra Kimia Indonesia. 6(2): 106-116

ASM International. (1990). Metals Handbook Vol. 1: Properties and Selection: Irons, Steels, and High-Performance Alloys.

Badan Pusat Statistik. (2024). Produksi Palawija (Ton), 2024. Diakses pada 8 November 2025. URL: https://tubankab.bps.go.id/id/statistics-table/2/MTE3IzI=/produksi-palawija.html

Badan Pusat Statistik. (2025). Luas Panen, Produksi, dan Produktivitas Jagung Menurut Provinsi, 2024. URL: https://www.bps.go.id/id/statistics-table/2/MjIwNCMy/luas-panen--produksi--dan-produktivitas-jagung-menurut-provinsi.html

Barrios-Gonzales, J., Perez-Sanchez, A., Bibian, M. (2020). New knowledge about the biosynthesis of lovastatin and its production by fermentation of Aspergillus terreus. Applied Microbiology and Biotechnology.

Barrios-González, J. (2012). Solid-state fermentation: Physiology of solid medium, its molecular basis and applications. Process Biochemistry, 47(2), 175–185.

Barrios-González, J. (2018). Secondary Metabolites Production. Current Developments in Biotechnology and Bioengineering, 257–283.

Barrios-González, J., Baños, J. G., Covarrubias, A. A., & Garay-Arroyo, A. (2008). Lovastatin biosynthetic genes of Aspergillus terreus are expressed differentially in solid-state and in liquid submerged fermentation. Applied Microbiology and Biotechnology, 79(2), 179–186.

Barrios-González, J., Miranda, R. U., Gómez-Quiroz, L. E., & Mejía, A. (2013). Oxidative state in idiophase links reactive oxygen species (ROS) and lovastatin biosynthesis: Differences and similarities in submerged- and solid-state fermentations. Fungal Biology, 117(2), 85–93. https://doi.org/10.1016/j.funbio.2012.12.001

Barrios-González, J., Pérez-Sánchez, A., & Bibián, M. E. (2020). New knowledge about the biosynthesis of lovastatin and its production by fermentation of Aspergillus terreus. Applied Microbiology and Biotechnology, 104(21), 8979–8998.

Baños, J. G., Tomasini, A., Szakács, G., & Barrios-González, J. (2009). High lovastatin production by Aspergillus terreus in solid-state fermentation on polyurethane foam: An artificial inert support. Journal of Bioscience and Bioengineering, 108(2), 105–110.

Bizukojc M, Pecyna M. (2011). Lovastatin and (+)-geodin formation by Aspergillus terreus ATCC 20542 in a batch culture with the simultaneous use of lactose and glycerol as carbon sources. Eng Life Sci. 2011;11:272–82.

Bizukojc, M., & Ledakowicz, S. (2007). A macrokinetic modelling of the biosynthesis of lovastatin by Aspergillus terreus. Journal of Biotechnology, 130(4), 422–435. https://doi.org/10.1016/j.jbiotec.2007.05.007

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Bizukojc, M., Pawlak, M., Boruta, T., & Gonciarz, J. (2012). Effect of pH on biosynthesis of lovastatin and other secondary metabolites by Aspergillus terreus ATCC 20542. Journal of Biotechnology, 162(2–3), 253–261.

Borku, A. W., Tora, T. T., & Masha, M. (2025). Cassava in focus: A comprehensive literature review, its production, processing landscape, and multi-dimensional benefits to society. In Food Chemistry Advances (Vol. 7). Elsevier Ltd.

Brown, G. G. (1950). Unit operations. Cbs Publishers & Distribu.

Brown, G. G., Sicar, D. V., & Brown, E. H. (1950). Unit operations. John Wiley & Sons.

Brownell, L., and Young, E. 1959. Process Equipment Design. New York: John Wiley 7 Sons Inc.

Buhalis, D., & Volchek, K. (2021). Bridging marketing theory and big data analytics: The taxonomy of marketing attribution. International Journal of Information Management, 56, 102253.

Bureau of Indian Standards. (1989). IS 3133: Manhole and inspection openings for chemical equipment - General requirements (1st revision). https://law.resource.org/pub/in/bis/S08/is.3133.1989.pdf

Byoung, P., Namwoo, Y., Jaesung, P., Tae, Y., Choi, Jin, Y., Busnaina, A., and Dongsik, K. (2011). Thermal conductivity of bovine serum albumin: A tool to probe denaturation of protein. Applied Physics Letters.

Carboué, Q., Rébufa, C., Hamrouni, R., Roussos, S., & Bombarda, I. (2020). Statistical approach to evaluate effect of temperature and moisture content on the production of antioxidant naphtho-gamma-pyrones and hydroxycinnamic acids by Aspergillus tubingensis in solid-state fermentation. Bioprocess and Biosystems Engineering, 43(12), 2283–2294.

Carter, W. J., & Ball, B. E. (2000). ASME Section VIII Div. 1, Pressure Vessels. McGraw-Hill Professional Publishing.

Casciatori, F. P., & Thoméo, J. C. (2018). Heat transfer in packed-beds of agricultural waste with low rates of air flow applicable to solid-state fermentation. Chemical Engineering Science, 188, 97–111.

Chandrasekhar, S., Vidhalani, S. K., Kumar, S., & Yadav, G. D. (2008). Solubility of Lovastatin in Ethyl Acetate, Propyl Acetate, Isopropyl Acetate, Butyl Acetate, sec-Butyl Acetate, Isobutyl Acetate, tert-Butyl Acetate, and 2-Butanone, between (285 and 313) K. Journal of Chemical & Engineering Data, 53(11), 2482-2486. https://doi.org/10.1021/je800120p

Chi, C. (2021, February 4). TAM SAM SOM: What Do They Mean & How Do You Calculate Them? Blog.hubspot.com. Diakses pada 8 November 2025. URL: https://blog.hubspot.com/marketing/tam-sam-som

Chougala, V., Gowda, A. C., Nagaraja, S., & Ammarullah, M. I. (2025). Effect of Chemical Treatments on Mechanical Properties of Sugarcane Bagasse (Gramineae Saccharum Officinarum L) Fiber Based Biocomposites: A Review. In Journal of Natural Fibers (Vol. 22, Issue 1). Taylor and Francis Ltd.

UNIVERSITAS
GADJAH MADA
**Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun**
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Coyle, J., & Ferguson, A. (2024, March 18). Market Sizing with TAM SAM SOM (with calculator) | Seer Interactive. Diakses pada 7 November 2025. URL: https://www.seerinteractive.com/insights/marketing-sizing-with-tam-sam-som

Davalas, A. (2024). The Importance of the Tam-Sam-Som Model and How Big Data and Ai Help. International Journal of Social Science and Economic Research, 08(12).

David, A. (2023). Submerged fermentation: the versatile process for industrial biotechnology. @WalshMedical

Dewi, R. T., Artanti, N., Mulyani, H., Lotulung, P. D. N., & Minarti. (2011). PRODUCTION OF LOVASTATIN AND SULOCHRIN BY Aspergillus terreus USING SOLID STATE FERMENTATION. MAKARA of Technology Series, 15(1).

Dinas Kesehatan Provinsi Aceh. (2023, 26 September). Kemenkes: Penyakit kardiovaskular penyebab kematian tertinggi di Indonesia. Dinas Kesehatan Provinsi Aceh. Diakses pada 7 November 2025. URL: https://dinkes.acehprov.go.id/detailpost/kemenkes-penyakit-kardiovaskular-penyebab-kematian-tertinggi-di-indonesia

Doran, P. M. (2013). Bioprocess engineering principles (2nd ed.). Academic Press, Cop.

Doran, P. M. (2013). Bioprocess engineering principles (2nd ed.). Academic Press.

Dragomir, S., Sinnot, M., Semercigil, S., and Turan, O. 2014. A study of energy dissipation and critical speed of granular flow in a rotating cylinder. Journal of Sound and Vibration.

Fachry, A. R., & Tumanggor, J. (2008). Pengaruh waktu kristalisasi dengan proses pendinginan terhadap pertumbuhan kristal amonium sulfat dari larutannya. Jurnal Teknik Kimia, 15(2).

Faisal, D. R., Lazuana, T., Ichwansyah, F., & Fitria, E. (2022). Faktor Risiko Hipertensi Pada Usia Produktif Di Indonesia Dan Upaya Penanggulangannya. Buletin Penelitian Sistem Kesehatan, 25(1), 32–41.

Garside, J. (1985). Industrial crystallization from solution. Chemical Engineering Science, 40(1), 3–26. https://doi.org/10.1016/0009-2509(85)85043-0

Gupta, K., Mishra, P.K. & Srivastava, P. A correlative evaluation of morphology and rheology ofAspergillus terreus during lovastatin fermentation. Biotechnol. Bioprocess Eng. 12, 140–146 (2007). https://doi.org/10.1007/BF03028640

Hafiza, R., Candra, A., & Lidiawati, M. (2024). Hubungan hipertensi, kadar kolesterol total, dan kadar LDL terhadap penyakit jantung koroner di Poli Jantung Rumah Sakit Pertamedika Ummi Rosnanti Kota Banda Aceh. Jurnal Ilmu Kedokteran dan Kesehatan, 11(10), 1966–1969. h

Hajjaj, H., Niederberger, P., & Duboc, P. (2001). Lovastatin Biosynthesis by Aspergillus terreus in a Chemically Defined Medium. Applied and Environmental Microbiology, 67(6), 2596–2602.

Hajko, P., Vesel, T., Ivan, R. & Miroslav, P. (1998). Process For The Isolation Of Lovastatin. United States Patent US 5,712,130, 27 Januari 1998.

Hardianto, D. (2014). Tinjauan Lovastatin dan Aplikasinya. Jurnal Bioteknologi & Biosains Indonesia. 1(1):38-44

Holman, J., P. (2010). Heat Transfer. New York: McGraw-Hill Publiser. 10-edition

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Index Fungorum Partnership (2025). Index Fungorum. Aspergillus terreus Thom., 1918. Accessed through: World Register of Marine Species at: https://www.marinespecies.org/aphia.php?p=taxdetails&id=100496 on 2025-10-07

Indrayani, Hambali, A., Jusran, dan Putra, R. 2024. pH dan Suhu Optimum Aktivitas Enzim Amilase Kapang Termofilik dari Hot Spring Sulili. Jurnal Pendidikan Teknologi Pertanian.

Isti'anah, I., Tarman, K., Suseno, S., Nugraha, R., dan Effendi, I. (2024). Penapisan Senyawa Bioaktif Antibakteri Fungi Laut Endofit Asal Pulau Buton SUlawesi Tenggara. JPHPI. 27(7):553-563

Jahromi, M. F., Liang, J. B., Ho, Y. W., Mohamad, R., Goh, Y. M., & Shokryazdan, P. (2012). Lovastatin Production byAspergillus terreusUsing Agro-Biomass as Substrate in Solid State Fermentation. Journal of Biomedicine and Biotechnology, 2012, 1–11. https://doi.org/10.1155/2012/196264

Jaivel N, Marimuthu P. 2010. Isolation and screening of lovastatin producing microorganisms. Int J Eng Sci Technol. 2010;2:2607–11.

Janani, B., Saibaba, G., Archunan, G., Vidhya, K., Karunyadevi, J., & Angayarkanni, J. (2017). PURIFICATION AND CYTOTOXICITY STUDY OF LOVASTATIN FROM SOIL FUNGI. Asian Journal of Pharmaceutical and Clinical Research, 10(10), 228.

Kamath, P. V., Dwarakanath, B. S., Chaudhary, A., & Janakiraman, S. (2015). Optimization of Culture Conditions for Maximal Lovastatin Production by Aspergillus terreus (KM017963) under Solid State Fermentation. HAYATI Journal of Biosciences, 22(4), 174–180.

Kementerian Kesehatan Republik Indonesia. (2024, 19 Maret). Survei Kesehatan Indonesia (SKI) 2023. Kementerian Kesehatan Republik Indonesia. Diakses pada 8 november 2025. URL: https://kemkes.go.id/id/survei-kesehatan-indonesia-ski-2023

Kementerian Pekerjaan Umum. (2015). Rencana Pengelolaan Sumber Daya Air Wilayah Sungai Bengawan Solo. Diakses pada 8 November 2025. URL: https://share.google/GAt3231ghVtzzz7Tb

Kementerian Pertanian. (2024). Analisis Kinerja Perdagangan Jagung. Edisi 1. Jakarta: Pusat Data dan Sistem Informasi Pertanian Sekretariat Jenderal Kementerian Pertanian.

Kern, D. (1965). Process Heat Transfer. Echo Point Books & Media.

Kesatuan Pelayanan Kesehatan (Keslan) Kemenkes. (2022, 31 Oktober). Kolesterol. Kementerian Kesehatan Republik Indonesia. Diakses pada 7 November 2025. URL: https://keslan.kemkes.go.id/view_artikel/1743/kolesterol

Khachatryan, N. (2024, July 15). How to Calculate TAM SAM SOM | PrometAI Blog. PrometAI. Diakses pada 8 November 2025. URL: https://prometai.app/blog/how-to-calculate-tam-sam-som?

Khairunisa, L. F., Widyasanti, A., & Nurjanah, S. (2019). Kajian Pengaruh Kecepatan Pengadukan terhadap Rendemen dan Mutu Kristal Patchouli Alcoholdengan Metode Cooling Crystallization. Journal of Tropical Agricultural Engineering and Biosystems-Jurnal Keteknikan Pertanian Tropis dan Biosistem, 7(1), 55-66. https://doi.org/10.21776/ub.jkptb.2019.007.01.6

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Khan. (2017). Three bioreactor system for the cultivation of mammalian cells.

Kim, M., & Day, D. F. (2011). Composition of sugar cane, energy cane, and sweet sorghum suitable for ethanol production at Louisiana sugar mills. Journal of Industrial Microbiology and Biotechnology, 38(7), 803–807.

Kleinig, A. R. (1997). Cell Disruption Mechanics. The University of Adelaide.

Kosaric, & Fazilet Vardar-Sukan. (2015). Biosurfactants : production and utilization--processes, technologies, and economics. Crc Press, Taylor & Francis Group.

Kristiandi, K., Lusiana, S. A., A'yunin, N. A. Q., Ramdhini, R. N., Marzuki, I., Rezeki, S., Erdiandini, I., Yunianto, A. E., Lestari, S. D., Ifadah, R. A., Kushargina, R., Yuniarti, T., & Pasanda, O. S. R. (2021). Teknologi fermentasi. Yayasan Kita Menulis.

Kumar, M., Jana, S. K., Senthil, V., Shashanka, V., Kumar, S., & Sadhukhan, A. (2000). Repeated fed-batch process for improving lovastatin production. Process Biochemistry, 36(4), 363–368.

Kumar, P. Raman, S. & Narula, P. (2006). Process For The Isolation of Lovastatin. United States Patent US 7,052,886 B2, 30 Mei 2006

Kumar, V., Ahluwalia, V., Saran, S., Kumar, J., Patel, A. K., & Singhania, R. R. (2020). Recent developments on solid-state fermentation for production of microbial secondary metabolites: Challenges and solutions. Bioresource Technology, 323, 124566.

Kyriakides, N., Karakatsanis, A., Stamatoudis, M., dan Psomas. 2001. Synergistic Hydrolysis of Crude Corn Starch by α-Amylases and Glucoamylases of Various Origins. American Association of Cereal Chemists.

Lai, L., Hung, C., dan Lou, C. (2007). Effects of Lactose and Glucose on Production of Itaconic Acid and Lovastatin by Aspergillus terreus ATCC 20542. Journal of Bioscience and Bioengineering. 104(1): 9-13

Liakopoulou-Kyriakides, M., Karakatsanis, A., Stamatoudis, M., & Psomas, S. (2001). Synergistic Hydrolysis of Crude Corn Starch by α-Amylases and Glucoamylases of Various Origins. Cereal Chemistry, 78(5), 603–607. https://doi.org/10.1094/cchem.2001.78.5.603

Lisec, B., Radež, I., & Žilnik, L. F. (2012). Solvent extraction of lovastatin from a fermentation broth. Separation and Purification Technology, 96, 187–193.

Lloyd Earl Brownell, & Edwin Harold Young. (1959). Process Equipment Design. New York Wiley.

López, J. C., Pérez, J. S., Sevilla, J. F., Fernández, F. A., Grima, E. M., & Chisti, Y. (2003). Production of lovastatin by Aspergillus terreus: effects of the C:N ratio and the principal nutrients on growth and metabolite production. Enzyme and Microbial Technology, 33(2–3), 270–277.

López, J. L. C., Porcel, E. M. R., Ferrón, M. a. V., Pérez, J. a. S., Sevilla, J. M. F., & Chisti, Y. (2004). Lovastatin inhibits its own synthesis in Aspergillus terreus. Journal of Industrial Microbiology & Biotechnology, 31(1), 48–50.

UNIVERSITAS
GADJAH MADA
Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000 ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Lopez, V. (2024). Automation and market opportunity analysis through the TAM SAM SOM methodology for new business development. Poligran.edu.co. Diakses pada 7 November 2025. URL: http://hdl.handle.net/10823/7550

Mahyuni, S. (2022). Biokonversi Mikroorganisme untuk Memproduksi Senyawa-Senyawa Bioaktif Nutraseutikal dan Farmaseutikal. Jurnal Bioteknologi & Biosains Indonesia. 9(1): 126-138

Manzoni, M., Rollini, M., Bergomi, S., & Cavazzoni, V. (1998). Production and purification of statins from Aspergillus terreus strains. Biotechnology Techniques, 12(7), 529–532.

Marta, H., dan Riyanti, T. (2017). Karakterisasi Maltodekstrin dari Pati Jagung (Zea mays) Menggunakan Metode Hidrolisis Asam pada Berbagai Konsentrasi. Chimica er Natura Acta. 5(1): 13-20

Mascarin, G. M., Golo, P. S., De Souza Ribeiro-Silva, C., Muniz, E. R., De Oliveira Franco, A., Kobori, N. N., & Fernandes, É. K. K. (2024). Advances in submerged liquid fermentation and formulation of entomopathogenic fungi. Applied Microbiology and Biotechnology, 108(1), 451.

Miranda, R. U., Gómez-Quiroz, L. E., Mendoza, M., Pérez-Sánchez, A., Fierro, F., & Barrios-González, J. (2014). Reactive oxygen species regulate lovastatin biosynthesis in Aspergillus terreus during submerged and solid-state fermentations. Fungal Biology, 118(12), 979–989.

Montserratt Herrera-Martell, Mejía, A., Gómez-Quiroz, L. E., & Barrios-González, J. (2025). Aspergillus terreus AtfB (bZIP) differently regulates lovastatin production in submerged fermentation and in solid-state fermentation. Bioscience Biotechnology and Biochemistry.

Moss, D. R. (2003). Pressure vessel design manual. Gulf Professional.

Mouafi, F., Ibrahim, G., dan Elsoud, M. (2016). Optimization of lovastatin production from Aspergillus fumigatus. Journal of Genetic engineering and Biotechnology. 14(2): 253-259

Mujumdar, A. (2006). Handbook of Industrial Drying. Poland: Taylor &Francis Group, third edition.

Mukherjee, R. (1998). Effectively design shell-and-tube heat exchangers. Chemical Engineering Progress, 94(2), 21-37.

Mulder, K. C., Mulinari, F., Franco, O. L., Soares, M. S., Magalhães, B. S., & Parachin, N. S. (2015). Lovastatin production: From molecular basis to industrial process optimization. Biotechnology Advances, 33(6), 648–665.

Na, H., Zheng, Y., Jia, Y., feng, J., Huang, J., Huang, J., Wang, C., dan Yao, G. (2024). Screening and genetic engineering of marine-derived Aspergillus terreus for high-efficient production of lovastatin. Microbial Cell Factories.

Nauli, T., dan Udin, Z. (2006). Model Fermentasi Lovastatin. Akta Kimindo. 1(2): 99-104

Nauval, M., Faoji, A., dan Syarifudin. (2021). Perancangan Alat Penggiling Biji Jagung Menjadi Tepung Mesin Disk Mill Tipe FFC 15. Jurnal Perancangan Alat.

Nichols, L. (2018, March 7). 4.7: Reaction Work-Ups. Chemistry LibreTexts.

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Novak, N., Gerdin, S., & Berovic, M. (1997). Increased lovastatin formation by Aspergillus terreus using repeated fed-batch process. Biotechnology Letters, 19(10), 947–948.

Oiza, N., Moral-Vico, J., Sánchez, A., Oviedo, E. R., & Gea, T. (2022). Solid-State Fermentation from Organic Wastes: A New Generation of Bioproducts. Processes, 10(12), 2675.

Osman, M. E., Khattab, O. H., Zaghlol, G. M., & El-Hameed, R. M. M. (2011). Optimization of some physical and chemical factors for lovastatin productivity by local strain of Aspergillus terreus. Australian Journal of Basic and Applied Sciences, 5(6), 718–732.

Osman, M., dan Zaghlot, G. (2011). Screening for the production of cholesterol lowering drugs (Lovastatin) by some fungi. Australian Journal of Basic and Applied Sciences, 5(6): 698-703

Ospankulova, G., Litvyak, V., Saduakhasova, S., Bulasev, B., Bokterbaeva, A., Yermekov, Y. (2020). Physucochemical Preoperties of Maltodextrins from Wheat and Corn Starch. Environmental Science, Engineering, and Management.

Owusu, A., Bonnaire, K., & Hailemeskel, B. (2024).   Lovastatin Use in Transplant: A Review and Survey. International Journal of Pharmaceutical Research and Allied Sciences, 13(1), 83–90.

Pakaya, F. (2025). Analisa Perbandingan Kandungan Karbohidrat Pada Jagung dan Ubi Jalar dalam Menggantikan Makanan Pokok Nasi. BIOLOGIKA: Jurnal Ilmiah Biologi. 1(1):17-26.

Pekkkanen, Ismo. (2012). Simulation and design of packed bed extraction column. LUT University.

Perry, R. H., & Green, D. W. (Eds.). (2008). Perry's chemical engineers' handbook (8th ed.). McGraw-Hill.

Perry, R. H., Green, D. W., & Maloney, J. O. (1997). Perry's Chemical Engineers' Handbook (7th ed.). McGraw-Hill.

Pharmacompass.com. (n.d). Lovastatin. Diakses pada 7 November 2025. URL: https://www.pharmacompass.com/active-pharmaceutical-ingredients/lovastatin

Porcel, E. R., López, J. C., Pérez, J. S., & Chisti, Y. (2006). Enhanced production of lovastatin in a bubble column by Aspergillus terreus using a two-stage feeding strategy. Journal of Chemical Technology & Biotechnology, 82(1), 58–64.

Prasad, L. (2024, April 12). Drill Bit Size Chart | Drill Size Chart in Fractional-Inch, Metric. ElectronicsHub. https://www.electronicshub.org/drill-bit-size-chart/

Purnomo, D., & Kusuma, M. P. (2022). Analisis faktor-faktor yang mempengaruhi produksi singkong di Kota Salatiga. Journal of Economics Research and Policy Studies, 2(1).

Puspitarini, O., Kentjonowaty, I., dan Rasbawati. (2024). Kadar Laktosa, Total Solid, dan Solid Non Fat Kefir Susu Sapi yang Diolah dari Jenis Susu Berbeda. Jurnal Peternakan. 21(1):33-37

Radha, K. V. & Lakshmanan, D. (2013). A review: Lovastatin production and applications. Asian Journal of Pharmaceutical and Clinical Research, 6(3):21-26.

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Radha, K., dan Lakshmanan, D. (2013). A Review: Lovastatin Production and Applications. Asian Journal of Pharmaceutical and Clinical Reseach. 6(3): 21-26

Rahayu, P. P., Miksusanti., Rasmiyana., Julianti, E., Prasetyo, A., & Yunita, C. N. (2025). Teknologi Enzim. Padang: HEI Publishing Indonesia.

Rahmawati, Naim, N., Nurhidayat, dan Irham, M. (2020). Uji Perbedaan Kadar Laktosa Pada Susu Formula dan Susu Fermentasi yang Diperjualbelikan di Supermarket Kota Makassar.

Rashid, J. I. A., Samat, N., & Yusoff, W. M. W. (2011). Optimization of Temperature, Moisture Content and Inoculum Size in Solid State Fermentation to Enhance Mannanase Production by Aspergillus terreus SUK-1 using RSM. Pakistan Journal of Biological Sciences, 14(9), 533–539. https://doi.org/10.3923/pjbs.2011.533.539

Riko, M., Dewi, E., dan Hasan, A. (2025). Optimasi Proses Pembuatan Gula Cair Berbahan Baku Pati Jagung Manis Menggunakan Hidrolisis Enzimatis dan Evaporator Bertekanan. Jurnal Teknologi Pangan dan Ilmu Pertanian. 7(2): 29-37

Rochani, A., Yuniningsih, S., & Ma'sum, Z. (2015). PENGARUH KONSENTRASI GULA LARUTAN MOLASES TERHADAP KADAR ETANOL PADA PROSES FERMENTASI. In Jurnal Reka Buana (Vol. 1, Issue 1).

Sadowska, A., Osiński, P., Roztocka, A., Kaczmarz-Chojnacka, K., Zapora, E., Sawicka, D., & Car, H. (2024). Statins—From Fungi to Pharmacy. In International Journal of Molecular Sciences (Vol. 25, Issue 1). Multidisciplinary Digital Publishing Institute (MDPI).

Sahilatua, F., Suter, I., dan Wiadyani, A. (2019). Pengaruh Umur Panen Terhadap Karakteristik Tapung Jagung Pulut Putih ((Zea mays var. ceratina). Jurnal Ilmu dan Teknologi Pangan. 8(4): 430-439

Salsabila, A., dan Fahruroji. (2021). Hidrolisis Pada Sintesis Gula Berbasis Pati Jagung. EDUFORTECH. 6(1):32-38

SANDHU, K., & SINGH, N. (2007). Some properties of corn starches II: Physicochemical, gelatinization, retrogradation, pasting and gel textural properties. Food Chemistry, 101(4), 1499–1507. https://doi.org/10.1016/j.foodchem.2006.01.060

Sciavolino. (1978). Semi-Synthetic Oleandomycins. United States Patent US 4,069,379, 17 Januari 1978.

Sethi, B. K., Rout, J. R., Das, R., Nanda, P. K., & Sahoo, S. L. (2012). Lipase production by Aspergillus terreus using mustard seed oil cake as a carbon source. Annals of Microbiology, 63(1), 241–252. https://doi.org/10.1007/s13213-012-0467-y

Seydametova, E., Salihon, J., Zainol, N., dan Convey, P. (2012). Production of Lovastatin by Penicillium spp. Soil Microfungi. International Journal of Chemical Engineering and Applications, Vol. 3, No. 5, October 2012

Sinnott, R. K. (2005). Coulson & Richardson's chemical engineering. Vol. 6, Chemical engineering design (4th ed., Vol. 6). Elsevier Butterworth-Heinemann.

Sinnott, R. K., & Towler, G. (2009). Chemical engineering design (5th ed.). Butterworth-Heinemann.

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Sinthia, H., Siahaan, W., & Waluyo, B. (2020). Keragaman karakter morfologi dan komponen hasil beberapa klon F1 hasil seleksi pendahuluan tebu (Saccharum officinarum L.). https://www.researchgate.net/publication/349641805

Smith, J. M., Ness, V., & Abbott, M. M. (2001). Introduction to chemical engineering thermodynamics. Mcgraw-Hill.

Srinivasakannan, C., Vasanthakumar, R., Iyappan, K., & Rao, P. G. (2002). A study on crystallization of oxalic acid in batch cooling crystallizer. Seed, 1, 3.

Srinivasan, N., Thangavelu, K., & Uthandi, S. (2022). Lovastatin production by an oleaginous fungus, Aspergillus terreus KPR12 using sago processing wastewater (SWW). Microbial Cell Factories, 21(1).

Starch Pasting: Uncover RVA Curve Insights via Rheology. (2025). NETZSCH - Analyzing and Testing. Leading in Thermal Analysis, Rheology and Fire Testing; Analyzing & Testing. https://analyzing-testing.netzsch.com/en-US/application-literature/starch-pasting-rva-curve-by-means-of-rheology

Stemler, J., Tobben, C., Lass-Florl, C., Steinman, J., Ackerman, K., Rath, P., Simon, M., Cornely, O., dan Koehler, P. (2023). Diagnosis and Treatment of Invasive Aspergillosis Caused by Non-fumigatus Aspergillus spp. J. Fungi 2023, 9, 500:1-20

Stull, D. R. (1947). Vapor Pressure of Pure Substances. Organic and Inorganic Compounds. Industrial & Engineering Chemistry, 39(4), 517–540. https://doi.org/10.1021/ie50448a022

Subramaniyam, R., & Vimala, R. (2012). Solid state and submerged fermentation for the production of bioactive substances: A comparative study. International Journal of Science and Nature, 3(3), 480–486.

Sulfur dioxide | 7446-09-5. (2026). ChemicalBook. https://www.chemicalbook.com/ChemicalProductProperty_IN_CB4323183.htm?utm

Sutamihardja, R., Azizah, M., & Mafiana, B. D. (2017). PERBANDINGAN HIDROLISIS ENZIMATIS DAN ASAM TERHADAP PATI JAGUNG MANIS (Zea mays L.) DALAM PEMBUATAN GULA CAIR. Jurnal Sains Natural, 7(2), 58–67.

Suwannarat, S., Ieekittayakorn, J., Sukpondma, Y., Rukachaisirikul, V., Phongpaichit, S., dan Chotigeat, W. (2019). Optimization of the Production of Lovastatin from Aspergillus sclerotiorum PSURSPG178 under Static Liquid Culture using Response Surface Methodology. Sains Malaysiana. 48(1): 93-102

Suwanto. 2013. Beras Produksi 2 ton/ha. Jakarta: Penebar Swadaya

Tomlovich, R. A., & Lash, T. D. (2024). Synthesis, Spectroscopic Properties, and Metalation of 3-Alkoxybenziporphyrins. Molecules, 29(8), 1903.

Treybal, R. (1981). Mass Transfer Operation. Singapore: Mc Graw-Hill Book Co, international third edition.

Tucak-Smajić, A. (n.d.). Rotary Vacuum Drum Filtration | BioRender Science Templates. Www.biorender.com. https://www.biorender.com/template/rotary-vacuum-drum-filtration

Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000
ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Turnovsky, S. J., & Wang, Z. (2022). The Effects of Globalization on Skilled Labor, Unskilled Labor, and the Skill Premium. Open Economies Review, 33(3), 407–452.

Ulrich, G. D. (1984). A Guide to Chemical Engineering Process Design and Economics. John Wiley & Sons, Inc.

Utami, D. (2021). Uji Aktivitas Antibiofilm Aspergillus terreus terhadap Biofilm Klebsiella pneumoniae. Skripsi. Fakultas Kedokteran dan Ilmu Kesehatan, Universitas Islam Negeri Maulana Malik Ibrahim Malang

V. C. RENGE, S. V. KHEDKAR, & NIKITA R., N. (2012). ENZYME SYNTHESIS BY FERMENTATION METHOD : A REVIEW. 585–590. https://www.tsijournals.com/articles/enzyme-synthesis-by-fermentation-method--a-review.pdf

Valera, H. R., Gomes, J., Lakshmi, S., Gururaja, R., Suryanarayan, S., & Kumar, D. (2005). Lovastatin production by solid state fermentation using Aspergillus flavipes. Enzyme and Microbial Technology, 37(5), 521–526.

Verified Market Reports. (2024, 7 November). Lovastatin market size, share, growth, and forecast. Verified Market Reports. Diakses pada 8 november 2025. URL: https://www.verifiedmarketreports.com/product/lovastatin-market/

Verma, R., Chauhan, N., Patel, S. V., Chandra, S., Sardar, R. S. S., & Patel, V. (2022). Cassava processing and its food application: A review. https://www.researchgate.net/publication/360670980

Walas, S. M. (1988). Chemical Process Equipment. Butterworth-Heinemann.

Walas, S. M. (1988). Chemical process equipment: Selection and design. Butterworths.

Wang, L., Fan, D., Chen, W., & Terentjev, E. M. (2015). Bacterial growth, detachment and cell size control on polyethylene terephthalate surfaces. Scientific Reports, 5(1). https://doi.org/10.1038/srep15159

Wang, S., Zhang, W., Zhang, J., Wu, S., Tian, M., & Yang, B. (2024). Screening and genetic engineering of marine-derived Aspergillus terreus for high-efficient production of lovastatin. Journal of Applied Microbiology.

Wang, W., Zhang, Y., Lee, K. S., & Li, B. (2019). Optimal design of a double pipe heat exchanger based on the outward helically corrugated tube. International Journal of Heat and Mass Transfer, 135, 706-716.

Wening, O. P., & Kuswurjanto, R. (2023). Karakteristik dan Performa Nira Tebu Berdasarkan Perbedaan Varietas dan Waktu Umur Tebang di Kebun Percobaan P3GI Pasuruan. Indonesian Sugar Research Journal, 3(2), 72–86.

World Health Organization. (2025). Cardiovascular diseases (CVDs) (Fact Sheet). World Health Organization. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds

Xie, L., Zhu, G., Shang, J., Chen, X., Zhang, C., Ji, X., Zhang, Q., & Wei, Y. (2021). An overview on the biological activity and anti-cancer mechanism of lovastatin. Cellular Signalling, 87. https://doi.org/10.1016/j.cellsig.2021.110122

UNIVERSITAS
GADJAH MADA
Prarancangan Pabrik Lovastatin dari Biji Jagung dan Jamur Aspergillus terreus dengan Kapasitas 3000 ton/tahun
Melvina Rahma Azalia, Prof. Sang Kompiang Wirawan, S.T., M.T., Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Yaws, C. L. (1999). Chemical properties handbook : physical, thermodynamic, environmental, transport, safety, and health related properties for organic and inorganic chemicals. Mcgraw-Hill.

Yaws,C.L.(1999). Chemical properties handbook : physical, thermodynamic, environmental, transport, safety, and health related properties for organic and inorganic chemicals. Mcgraw-Hill.

Yolency. (2024). Panen Raya Jagung, Dirjen Tanaman Pangan Kementerian Pertanian: Produktivitas Jagung di Tuban Capai 7 Ton per Hektar. Diakses pada 5 November 2025.URL: https://tubankab.go.id/entry/panen-raya-jagung-dirjen-tanaman-pangan-kementerian-pertanian-produktivitas-jagung-di-tuban-capai-7-ton-per-hektare.

Yudha, A. K., & Suidah, H. (2023). Studi korelasi pola makan dengan kadar kolesterol pada pasien stroke. JURNAL PENGEMBANGAN ILMU DAN PRAKTIK KESEHATAN, 2(1), 48–61. http://e-journal.lppmdianhusada.ac.id/index.php/PIPK

Yulianita, R. I. N. I., Sopyan, I., & Muchtaridi, M. (2018). Forced degradation study of statins: A review. Int. J. App. Pharm, 10, 38-42. http://dx.doi.org/10.22159/ijap.2018v10i6.29086

Zarei, M., Norouzi, H., dan Sahlodin, A. COmputational fluid dynamics simulation of a jet crystallization of lovastatin. Scientific Report. 14(907).

Ábrego-Gacía, A., Poggi-Varaldo, H. M., Robles-González, V., Ponce-Noyola, T., Calva-Calva, G., Ríos-Leal, E., Estrada-Bárcenas, D., & Mendoza-Vargas, A. (2021). Lovastatin as a supplement to mitigate rumen methanogenesis: an overview. In Journal of Animal Science and Biotechnology (Vol. 12, Issue 1). BioMed Central Ltd.

Šála, M., Dejmek, M., Eliška Procházková, Hřebabecký, H., Jiří Rybáček, Dračínský, M., P. Novák, Šárka Rosenbergová, Jiří Fukal, Vladimír Sychrovský, Rosenberg, I., & Radim Nencka. (2015). Synthesis of locked cyclohexene and cyclohexane nucleic acids (LCeNA and LCNA) with modified adenosine units. Organic and Biomolecular Chemistry, 13(9), 2703–2715.