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References

Abdullah, M. F., Heidari, P., Rahim, A., Ahmed, I., & Poczai, P. (2021). Pseudogenization of the chloroplast threonine (*trnT-GGU*) gene in the sunflower family (Asteraceae). *Scientific Reports, 11*(1), 21122. https://doi.org/10.1038/s41598-021-00510-4

Abdulbaki, A. S., Alsamadany, H., Alzahrani, Y., & Olayinka, B. U. (2022). Rubisco and abiotic stresses in plants: Current assessment. *Turkish Journal of Botany, 46*(6), Article 2. https://doi.org/10.55730/1300-008X.2730

Ai, A., Subandiyah, S., & Soffan, A. (2019, September 12–13). Presentasi BioMIC UGM.

Ainsworth, E. A., & Ort, D. R. (2010). How do we improve crop production in a warming world? *Plant Physiology, 154*(2), 526–530. https://doi.org/10.1104/pp.110.161349

Amar, M. H. (2020). *ycf1-ndhF* genes, the most promising plastid genomic barcode, sheds light on phylogeny at low taxonomic levels in *Prunus persica*. *Journal of Genetic Engineering and Biotechnology, 18*(1), 42.

Amaral, J., Lobo, A. K. M., & Carmo-Silva, E. (2024). Regulation of Rubisco activity in crops. *New Phytologist, 241*, 35-51. https://doi.org/10.1111/nph.19369

Anonymous. (2008). Asian citrus psyllid & Huanglongbing reported in Louisiana. *USDA-APHIS-PPQ (06/13/2008)*. *Citrus Clonal Protection Program (CCPP) – Citrus News*. Retrieved from http://ccpp.ucr.edu/

Anonymous. (2009). Huanglongbing, citrus – Puerto Rico: 1st report. *ProMED-mail*. Retrieved from http://www.promedmail.org

Apel, K., & Hirt, H. (2004). Reactive oxygen species: Metabolism, oxidative stress, and signal transduction. *Annual Review of Plant Biology, 55*(1), 373–399. https://doi.org/10.1146/annurev.arplant.55.031903.141701

Astuti, I. P., & Rugayah. (2016). A new species of *Murraya* from Cyclops Mountain, Papua, Indonesia. *Reinwardtia, 15*(2), 111–114.

Aubert, B. (1987). *Trioza erytreae Del Guercio* and *Diaphorina citri Kuwayama* (Homoptera: Psylloidae), the two vectors of citrus greening disease: Biological aspects and possible control strategies. *Fruits, 42*, 149-162.

Aubert, B. (1990). Prospects for citriculture in Southeast Asia by the year 2000. *FAO Plant Protection Bulletin, 38*, 151–173.

Aubert, B. (1993). Citrus greening disease, a serious limiting factor for citriculture in Asia and Africa. In *Proceedings of the 4th Congress of the International Society of Nurserymen* (pp. 134–142).

Backer, C. A., & Bakhuizen van den Brink, R. C. (1965). *Flora of Java* (Vol. II). N.V.P. Noordhoff-Groningen-The Netherlands.

Badan Pusat Statistik. (2024). *Distribusi perdagangan komoditas jeruk Indonesia 2024* (Vol. 1). Jakarta: Badan Pusat Statistik.

Badotti, F., Oliveira, F. D., Garcia, C. F., Vaz, A., Fonseca, P., & Nahum, L. A. et al. (2017). Effectiveness of ITS and sub-regions as DNA barcode markers for the identification of basidiomycota (fungi). *BMC Microbiology, 17*(42). https://doi.org/10.1186/s12866-017-0958-x

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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Baxter, A., Mittler, R., & Suzuki, N. (2014). ROS as key players in plant stress signalling. *Journal of Experimental Botany, 65*(5), 1229–1240. https://doi.org/10.1093/jxb/ert375

Beattie, G. A. C., & Barkley, P. (2009). *Huanglongbing and its vectors: A pest–specific contingency plan for the citrus and nursery and garden industries* (Version 2). Horticulture Australia Ltd.

Belas, R., Manos, J., & Suvanasuthi, R. (2004). *Proteus mirabilis* ZapA metalloprotease degrades a broad spectrum of substrates, including antimicrobial peptides. *Infection and Immunity, 72*(9), 5159–5167. https://doi.org/10.1128/IAI.72.9.5159-5167.2004

Beloti, V. H., Santos, F., Alves, G. R., Bento, J. M. S., & Yamamoto, P. T. (2017). Curry leaf smells better than citrus to females of *Diaphorina citri* (Hemiptera: Liviidae). *Arthropod-Plant Interactions, 5*, 709–716.

Berman, J. J. (2016). *Data simplification: Taming information with open source tools*. Elsevier.

Bettini, P. P., Cosi, E., Bindi, D., & Buiatti, M. (2008). Reactive oxygen species metabolism in plants: Production, detoxification, and signaling in the stress response. *Plant Science Journal*.

Bhagabati, K. N. (1993). Survey of greening disease of mandarin orange in the northeastern states of India. In P. Moreno, J. V. da Graca, & L. W. Timmer (Eds.), *Proceedings of the 12th Conference of the International Organization of Citrus Virologists* (pp. 441–442). Riverside, CA: IOCV.

Bhattacharjee, S. (2019). ROS and oxidative stress: Origin and implication. In *Reactive Oxygen Species in Plant Biology* (pp. 1–31). Springer.

Bilgin, D. D., Zavala, J. A., Zhu, J., Clough, S. J., Ort, D. R., & DeLucia, E. H. (2010). Biotic stress globally downregulates photosynthesis genes. *Plant, Cell & Environment, 33*(10), 1597–1613. https://doi.org/10.1111/j.1365-3040.2010.02167.x

Botstein, D., White, R. L., Skolnick, M., & Davis, R. W. (1980). Construction of a genetic linkage map in man using restriction fragment length polymorphisms. *American Journal of Human Genetics, 32*(3), 314–331. PMID: 6247908; PMCID: PMC1686077.

Bové, J. M. (2006). Huanglongbing: A destructive, newly-emerging, century-old disease of citrus. *Journal of Plant Pathology, 88*(1), 7–37.

Bruna, R. E., Molino, M. V., Lazzaro, M., Mariscotti, J. F., & Garcia Vescovi, E. (2018). Cpx R-dependent thermoregulation of *Serratia marcescens* Prt A metalloprotease expression and its contribution to bacterial biofilm formation. *Journal of Bacteriology, 200*, e00006–e00018. https://doi.org/10.1128/JB.00006-18

Campbell, C. L., & Madden, L. V. (1990). *Introduction to plant disease epidemiology*. John Wiley & Sons.

Canales, E., Coll, Y., Hernandez, I., Portieles, R., Garcia, M. R., Lopez, Y., ... Borras-Hidalgo, O. (2016). *Candidatus Liberibacter asiaticus*, causal agent of citrus Huanglongbing, is reduced by treatment with brassinosteroids. *PLoS ONE, 11*(4), e0153523. https://doi.org/10.1371/journal.pone.0153523

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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Cao, H., Bowling, S. A., Gordon, A. S., & Dong, X. (1994). Characterization of an *Arabidopsis* mutant that is nonresponsive to inducers of systemic acquired resistance. *The Plant Cell, 6*(11), 1583–1592.

Carmo-Silva, E., Scales, J. C., Madgwick, P. J., & Parry, M. A. J. (2015). Optimizing Rubisco and its regulation for greater resource use efficiency. *Plant, Cell & Environment, 38*(9), 1817–1832. https://doi.org/10.1111/pce.12425

Castro, M. S., & Fontes, W. (2005). Plant defense and antimicrobial peptides. *Protein and Peptide Letters, 12*(1), 11–16.

CBOL Plant Working Group. (2009). A DNA barcode for land plants. *Proceedings of the National Academy of Sciences of the United States of America, 106*(31), 12794–12797. https://doi.org/10.1073/pnas.0905845106

Chaouch, S., Queval, G., & Noctor, G. (2011). AtRbohF is a crucial modulator of defence-associated metabolism and a key actor in the interplay between intracellular oxidative stress and pathogenesis responses in Arabidopsis. *The Plant Journal, 69*(4), 613–627. https://doi.org/10.1111/j.1365-313x.2011.04816.x

Chapman, J. M., Muhlemann, J. K., Gayomba, S. R., & Muday, G. K. (2019). RBOH-dependent ROS synthesis and ROS scavenging by plant specialized metabolites to modulate plant development and stress responses. *Chemical Research in Toxicology*. https://doi.org/10.1021/acs.chemrestox.9b0002

Chen, H., Shao, J., Zhang, H., Jiang, M., Huang, L., Zhang, Z., ... Wang, H. (2018). Sequencing and analysis of *Strobilanthes cusia* (Nees) Kuntze chloroplast genome revealed the rare simultaneous contraction and expansion of the inverted repeat region in angiosperms. *Frontiers in Plant Science, 9*, 324. https://doi.org/10.3389/fpls.2018.00324

Chiang, K.-S., Liu, H., & Bock, C. (2017). A discussion on disease severity index values. Part I: Warning on inherent errors and suggestions to maximise accuracy. *Annals of Applied Biology, 171*, 139–154.

Cifuentes-Arenas, J. C., Beattie, G. A. C., Pena, L., & Lopes, S. A. (2019). *Murraya paniculata* and *Swinglea glutinosa* as short-term transient hosts of *Candidatus Liberibacter asiaticus* and implications for spread of Huanglongbing. *Phytopathology, 109*(12), 2067–2073. https://doi.org/10.1094/PHYTO-06-19-0216-R

Cong, Q., Kinch, L. N., Kim, B. H., & Grishin, N. V. (2012). Predictive sequence analysis of the *Candidatus Liberibacter asiaticus* proteome. *PLoS ONE, 7*(7), e41071. https://doi.org/10.1371/journal.pone.0041071

CSMU Taiwan iGEM Team. (2019). *Protein dialysis*. Retrieved from https://static.igem.org/mediawiki/2019/4/47/T--CSMU_Taiwan--proteindialysis.pdf

da Graça, J. V. (1991). Citrus greening disease. *Annual Review of Phytopathology, 29*(1), 109–136. https://doi.org/10.1146/annurev.py.29.090191.000545

Dahler, G. S., Barras, F., & Keen, N. T. (1990). Cloning of genes encoding extracellular metalloproteases from *Erwinia chrysanthemi* EC16. *Journal of Bacteriology, 172*(10), 5803–5815.

UNIVERSITAS GADJAH MADA
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Dai, K., Ikeshiri, T., Matsuura, T., Kimura, S., Hamagami, A., Fujiwara, Y., Kobashigawa, Y., & Miyakuni, S. (2005). Investigation of host range of *Candidatus Liberibacter asiaticum*—Is *Murraya paniculata* a host plant of *Candidatus L. asiaticum*? *Research Bulletin of Plant Protection Service (Japan), 41*, 53–57.

Dalalthakur, S., Singh, P., Singh, S., Sasmal, A., Deb, T., Karmakar, S., Dasgupta, T., Sarkar, S., Sarkar, S., Ghosh, B., & Ghosh, S. (2023). Role of pathogenesis-related (PR) proteins in plant microbes defence mechanism. *Journal of Survey in Fisheries Sciences, 10*(1S), 6344–6352.

Dala-Paula, B. M., Plotto, A., Bai, J., Manthey, J. A., Baldwin, E. A., Ferrarezi, R. S., & Gloria, M. B. A. (2019). Effect of Huanglongbing or greening disease on orange juice quality: A review. *Frontiers in Plant Science, 9*, 1976.

Damsteegt, V. D., Postnikova, E. N., Stone, A. L., Kuhlmann, M., & Wilson, C. (2010). *Murraya paniculata* and related species as potential hosts and inoculum reservoirs of *'Candidatus Liberibacter asiaticus'*, causal agent of huanglongbing. *Plant Disease, 94*, 528–533.

Das, K., & Roychoudhury, A. (2014). Reactive oxygen species (ROS) and response of antioxidants as ROS-scavengers during environmental stress in plants. *Frontiers in Environmental Science, 2*. https://doi.org/10.3389/fenvs.2014.00053

Deng, X., Zhou, G., Li, H., Chen, J., & Civerolo, E. L. (2007). Nested-PCR detection and sequence confirmation of *'Candidatus Liberibacter asiaticus'* from *Murraya paniculata* in Guangdong, China. *Plant Disease, 91*(8), 1051. https://doi.org/10.1094/PDIS-91-8-1051C

Denisov, G., Walenz, B., Halpern, A. L., Miller, J., Axelrod, N., Levy, S., & Sutton, G. (2008). Consensus generation and variant detection by Celera Assembler. *Bioinformatics, 24*(9), 1035–1040. https://doi.org/10.1093/bioinformatics/btn074

Dewi, R., Giyanto, G., & Dadang, D. (2022). Kombinasi biopestisida dan varietas tahan dalam pengendalian penyakit blas. *Jurnal Penelitian Pertanian Tanaman Pangan, 6*, 97–106. https://doi.org/10.21082/jpptp.v6n2.2022.p97-106

Drummond, A. J., & Rambaut, A. (2007). BEAST: Bayesian evolutionary analysis by sampling trees. *BMC Evolutionary Biology, 7*, 214.

Drzewiecka, K., Borowiak, K., Bandurska, H., & Golinski, P. (2012). Salicylic acid—A potential biomarker of *Nicotiana tabacum* Bel-W3 cell death developed as a response to ground-level ozone under ambient conditions. *Acta Biologica Hungarica, 63*, 231–249. https://doi.org/10.1556/ABiol.63.2012.2.6

Duan, Y., Zhou, L., Hall, D. G., Li, W., Doddapaneni, H., Lin, H., ... & Gottwald, T. (2009). Complete genome sequence of citrus Huanglongbing bacterium, *Candidatus Liberibacter asiaticus*, obtained through metagenomics. *Molecular Plant–Microbe Interactions, 22*(8), 1011–1020.

Dunwell, J. M., Khuri, S., & Gane, P. J. (2000). Microbial relatives of the seed storage proteins of higher plants: Conservation of structure and

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

diversification of function during evolution of the cupin superfamily. *Microbiology and Molecular Biology Reviews, 64*, 153–179.

Durrant, W. E., & Dong, X. (2004). Systemic acquired resistance. *Annual Review of Phytopathology, 42*, 185–209. https://doi.org/10.1146/annurev.phyto.42.040803.140421

Dutt, M., Barthe, G., Irey, M., & Grosser, J. (2015). Transgenic citrus expressing an *Arabidopsis NPR1* gene exhibit enhanced resistance against Huanglongbing (*HLB; Citrus Greening*). *PLoS ONE, 10*(9), e0137134.

Edwards, S. T., & Lindley, J. (1820). *The botanical register: Consisting of coloured figures of exotic plants, cultivated in British gardens; with their history and mode of treatment* (Vol. V). London: James Ridgeway.

Ellinger, D., & Voigt, C. A. (2014). Callose biosynthesis in Arabidopsis with a focus on pathogen response: What we have learned within the last decade. *Annals of Botany, 114*(6), 1349–1358. https://doi.org/10.1093/aob/mcu120

Fan, W., Wu, Y., Yang, J., Shahzad, K., & Li, Z. (2018). Comparative chloroplast genomics of *Dipsacales* species: Insights into sequence variation, adaptive evolution, and phylogenetic relationships. *Frontiers in Plant Science, 9*, 689. https://doi.org/10.3389/fpls.2018.00689

Farvardin, A., González-Hernández, A. I., Llorens, E., García-Agustín, P., Scalschi, L., & Vicedo, B. (2020). The apoplast: A key player in plant survival. *Antioxidants, 9*(7), 604. https://doi.org/10.3390/antiox9070604

Farvardin, A., González-Hernández, A. I., Llorens, E., García-Agustín, P., Scalschi, L., & Vicedo, B. (2020). The apoplast: A key player in plant survival. *Antioxidants (Basel)*, *9*(7), 604. https://doi.org/10.3390/antiox9070604

Foyer, C. H., & Noctor, G. (2005). Redox homeostasis and antioxidant signaling: A metabolic interface between stress perception and physiological responses. *The Plant Cell, 17*(7), 1866–1875.

Francis, M. I., Redondo, A., Burns, J. K., & Graham, J. H. (2009). Soil application of imidacloprid and related SAR-inducing compounds produces effective and persistent control of citrus canker. *European Journal of Plant Pathology, 124*(2), 283–292. https://doi.org/10.1007/s10658-008-9404-6

French, J. V., Kahlke, C. J., & da Graça, J. V. (2001). First record of the Asian citrus psylla, *Diaphorina citri* Kuwayama (Homoptera: Psyllidae), in Texas. *Subtropical Plant Science, 53*, 14–15.

Fujikawa, T. and Iwanami, T. 2012. Sensitive and robust detection of citrus greening (huanglongbing) bacterium '*Candidatus* Loberibacter asiaticus' by DNA amplification with new 16S rDNA-specific primers. Molecular and Cellular Probes 26:194-197.

Fujiwara, K., Iwanami, T., & Fujikawa, T. (2018). Alterations of *Candidatus Liberibacter asiaticus*-associated microbiota decrease survival of *Ca. L. asiaticus* in in vitro assays. *Frontiers in Microbiology, 9*, 1–12.

Galimberti, A., De Mattia, F., Losa, A., Bruni, I., Federici, S., Casiraghi, M., ... & Labra, M. (2012). DNA barcoding as a new tool for food traceability. *Food Research International, 50*(1), 55–63. https://doi.org/10.1016/j.foodres.2012.09.036

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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Galtier, N., & Daubin, V. (2008). Dealing with incongruence in phylogenomic analyses. *Philosophical Transactions of the Royal Society B: Biological Sciences, 363*(1512), 4023–4029.

Gao, J., Tao, T., Arthurs, S. P., Hussain, M., Ye, F., & Mao, R. (2023). Saliva-mediated contrasting effects of two citrus aphid species on Asian citrus psyllid feeding behavior and plant jasmonic acid pathway. *Insects, 14*(8), 672. https://doi.org/10.3390/insects14080672

Garcia, L., Molina, M. C., Padgett-Pagliai, K. A., Torres, P. S., Bruna, R. E., García Véscovi, E., González, C. F., Gadea, J., & Marano, M. R. (2022). A serralysin-like protein of *Candidatus Liberibacter asiaticus* modulates components of the bacterial extracellular matrix. *Frontiers in Microbiology, 13*, 1006962. https://doi.org/10.3389/fmicb.2022.1006962

Garg, N., & Manchanda, G. (2009). ROS generation in plants: Boon or bane? *Plant Biosystems - An International Journal Dealing with All Aspects of Plant Biology, 143*(1), 81–96. https://doi.org/10.1080/11263500802633626

Garnier, M., & Bové, J. M. (1993). Citrus greening disease and the greening bacterium. In P. Moreno, J. V. da Graça, & L. W. Timmer (Eds.), *Proceedings of the Twelfth Conference of the International Organization of Citrus Virologists* (pp. 212–219). Riverside: International Organization of Citrus Virologists, University of California.

Garnier, M., Daniel, N., & Bové, J. M. (1984). The greening organism is a Gram-negative bacterium. In S. M. Garnsey, L. W. Timmer, & J. A. Dodds (Eds.), *Proceedings of the Ninth Conference of the International Organization of Citrus Virologists* (pp. 115–124). Riverside: University of California.

Gernhard, T. (2008). The conditioned reconstructed process. *Journal of Theoretical Biology, 253*(4), 769–778. https://doi.org/10.1016/j.jtbi.2008.04.005

Gielly, L., & Taberlet, P. (1994). The use of chloroplast DNA to resolve plant phylogenies: Noncoding versus *rbcL* sequences. *Molecular Biology and Evolution, 11*, 769–777.

Goulding, S. E., Olmstead, R. G., Morden, C. W., & Wolfe, K. H. (1996). Ebb and flow of the chloroplast inverted repeat. *Molecular Genetics and Genomics, 252*, 195–206.

Guo, W. W., & Deng, X. X. (1998). Somatic hybrid plantlets regeneration between *Citrus* and its wild relative, *Murraya paniculata*, via protoplast electrofusion. *Plant Cell Reports, 18*, 297–300.

Hajibabaei, M., Singer, G. A. C., Hebert, P. D. N., & Hickey, D. A. (2007). DNA barcoding: How it complements taxonomy, molecular phylogenetics, and population genetics. *Trends in Genetics, 23*(4), 167–172. https://doi.org/10.1016/j.tig.2007.02.001

Halbert, S. (2005). The discovery of Huanglongbing in Florida. In *Proceedings of the 2nd International Citrus Canker and Huanglongbing Workshop* (p. 50). Orlando, FL.

Halbert, S. E. (1998). Entomology Section. *Triology, 37*(3), 6–7.

Halbert, S. E., & Manjunath, K. L. (2004). Asian citrus psyllids (Sternorrhyncha: Psyllidae) and greening disease of citrus: A literature review and assessment of risk in Florida. *Florida Entomologist, 87*(3), 330–354.

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Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Hall, D. (2008). Effects of freezes on survival of *Diaphorina citri*. In *Proceedings of the International Research Conference on Huanglongbing* (p. 5).

Hall, P. (2001). *BioEdit* (Version 5.0.6). Department of Microbiology, North Carolina State University.

Hebert, P. D. N., Cywinska, A., Ball, S. L., & DeWaard, J. R. (2003). Biological identifications through DNA barcodes. *Proceedings of the Royal Society B: Biological Sciences, 270*, 313–321. https://doi.org/10.1098/rspb.2002.2218

Henderson, J. N., Hazra, S., Dunkle, A. M., & Salvucci, M. E. (2013). Biophysical characterization of higher plant Rubisco activase. *Biochimica et Biophysica Acta (BBA) - Proteins and Proteomics, 1834*(1), 87–97. https://doi.org/10.1016/j.bbapap.2012.09.006

Himawan, A., Sumardiyono, Y. B., Somowiyarjo, S., Trisyono, Y. A., & Beattie, A. (2011). Deteksi menggunakan PCR (*Polymerase Chain Reaction*) *Candidatus Liberibacter asiaticus*, penyebab Huanglongbing pada jeruk siem dengan beberapa tipe gejala pada daun. *Jurnal Perlindungan Tanaman Tropis, 10*(3), 178–183.

Hoot, S. B., Culham, A., & Crane, P. R. (1995). The utility of *atpB* gene sequences in resolving phylogenetic relationships: Comparison with *rbcL* and 18S ribosomal DNA sequences in the Lardizabalaceae. *Annals of the Missouri Botanical Garden, 82*(2), 194–207.

Horváth, E. M., Peter, S. O., Joët, T., Rumeau, D., Cournac, L., Horváth, G. V., Kavanagh, T. A., Schäfer, C., Peltier, G., & Medgyesy, P. (2000). Targeted inactivation of the plastid *ndhB* gene in tobacco results in an enhanced sensitivity of photosynthesis to moderate stomatal closure. *Plant Physiology, 123*(4), 1337–1350. https://doi.org/10.1104/pp.123.4.1337

Hou, J., Ye, X., Feng, W., Zhang, Q., Han, Y., Liu, Y., Li, Y., & Wei, Y. (2022). Distance correlation application to gene co-expression network analysis. *BMC Bioinformatics, 23*(1), 81. https://doi.org/10.1186/s12859-022-04609-x

Hu, J., Jiang, J., & Wang, N. (2018). Control of citrus Huanglongbing via trunk injection of plant defense activators and antibiotics. *Phytopathology, 108*(2), 186–195.

Hu, X., Bidney, D. L., Yalpani, N., Duvick, J. P., Crasta, O., Folkerts, O., & Lu, G. (2003). Overexpression of a gene encoding hydrogen peroxide-generating oxalate oxidase evokes defense responses in sunflower. *Plant Physiology, 133*(1), 170–181. https://doi.org/10.1104/pp.103.024026

Hu, X., Zhang, A., Zhang, J., & Jiang, M. (2006). Abscisic acid is a key inducer of hydrogen peroxide production in leaves of maize plants exposed to water stress. *Plant and Cell Physiology, 47*(11), 1484–1495.

Hua, Z., & Yuan, Y. (2023). *Murraya paniculata* chloroplast, complete genome. Retrieved January 3, 2025, from https://www.ncbi.nlm.nih.gov/nuccore/NC_052700

Huang, C. C. (1997). *Flora Reipublicae Popularis Sinicae.* Tomus 43(2).

Huang, S., Ge, X., Cano, A., Salazar, B. G. M., & Deng, Y. (2020). Comparative analysis of chloroplast genomes for five *Dicliptera* species (*Acanthaceae*):

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Molecular structure, phylogenetic relationships, and adaptive evolution. *PeerJ, 8*, e8450. https://doi.org/10.7717/peerj.8450

Hung, T. H., Wu, M. L., & Su, H. J. (2000). Identification of alternative hosts of the fastidious bacterium causing citrus greening disease. *Journal of Phytopathology, 148*(6), 321–326.

Husain, M. A., & Nath, L. D. (1927). The citrus psylla (*Diaphorina citri*, Kuw.) [Psyllidae: Homoptera]. *Memoirs of the Department of Agriculture in India, Series 10*(5), 1–27.

Huxley-Jones, E., Shaw, J. L., Fletcher, C., Parnell, J., & Watts, P. C. (2012). Use of DNA barcoding to reveal species composition of convenience seafood. *Conservation Biology, 26*(2), 367–371. https://doi.org/10.1111/j.1523-1739.2011.01813.x

Ikeda, K., & Ashihara, W. (2008). Preference of adult Asian citrus psyllid, *Diaphorina citri* (Homoptera: Psyllidae) for *Murraya paniculata* and *Citrus unshiu*. *Japanese Journal of Applied Entomology and Zoology, 52*(1), 27–30. https://doi.org/10.1303/jjaez.2008.27

Jagoueix, S., Bové, J. M., & Garnier, M. (1994). The phloem-limited bacterium of greening disease of citrus is a member of the α-subdivision of Proteobacteria. *International Journal of Systematic Bacteriology, 44*(3), 379–386.

Jagoueix, S., Bové, J. M., & Garnier, M. (1997). Comparison of the 16S/23S ribosomal intergenic regions of *"Candidatus Liberobacter asiaticum"* and *"Candidatus Liberobacter africanum,"* the two species associated with citrus Huanglongbing (greening) disease. *International Journal of Systematic Bacteriology, 47*(2), 224–227.

Jansen, R. K., & Ruhlman, T. A. (2012). Plastid genomes of seed plants. In *Advances in Photosynthesis and Respiration* (Vol. 35, pp. 103–126). Springer.

Jansen, R. K., Raubeson, L. A., Boore, J. L., de Pamphilis, C. W., Chumley, T. W., Haberle, R. C., et al. (2005). Methods for obtaining and analyzing whole chloroplast genome sequences. *Methods in Enzymology, 395*, 348–384. https://doi.org/10.1016/s0076-6879(05)95020-9

Johnson, L. A., & Soltis, D. E. (1994). *matK* DNA sequences and phylogenetic reconstruction in *Saxifragaceae* s. str. *Systematic Botany, 19*(1), 143–156.

Joly, S., Starr, J. R., Lewis, W. H., & Bruneau, A. (2006). Polyploid and hybrid evolution in roses east of the Rocky Mountains. *American Journal of Botany, 93*(3), 412–425.

Joshi, V., Joshi, N., Vyas, A., & Jadhav, S. K. (2021). Pathogenesis-related proteins: Role in plant defense. In *Biocontrol agents and secondary metabolites: Applications and immunization for plant growth and protection* (pp. 573–590). Elsevier. https://doi.org/10.1016/B978-0-12-822919-4.00025-9

Karuppanapandian, T., Moon, J.-C., Kim, C., Manoharan, K., & Kim, W. (2011). Reactive oxygen species in plants: Their generation, signal transduction, and scavenging mechanisms. *Australian Journal of Crop Science, 5*, 709–725.

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Kashyap, K., & Banu, S. (2019). Characterizing ethylene pathway genes during the development, ripening, and postharvest response in *Citrus reticulata* Blanco fruit pulp. *Turkish Journal of Botany, 43*(4).

Katoh, H., Miyata, S., Inoue, H., & Iwanami, T. (2014). Unique features of a Japanese *"Candidatus Liberibacter asiaticus"* strain revealed by whole genome sequencing. *PLoS One, 9*(9). https://doi.org/10.1371/journal.pone.0106883

Khan, M. I., Fatma, M., Per, T. S., Anjum, N. A., & Khan, N. A. (2015). Salicylic acid-induced abiotic stress tolerance and underlying mechanisms in plants. *Frontiers in Plant Science, 6*, 462. https://doi.org/10.3389/fpls.2015.00462

Kida, Y., Inoue, H., Shimizu, T., & Kuwano, K. (2007). *Serratia marcescens* serralysin induces inflammatory responses through protease-activated receptor 2. *Infection and Immunity, 75*(1), 164–174. https://doi.org/10.1128/IAI.01239-06

Kim, J. S., Sagaram, U. S., Burns, J. K., Li, J. L., & Wang, N. (2009). Response of sweet orange (*Citrus sinensis*) to *"Candidatus Liberibacter asiaticus"* infection: Microscopy and microarray analyses. *Phytopathology, 99*, 50–57.

Kim, K. J., & Jansen, R. K. (1995). *ndhF* sequence evolution and the major clades in the sunflower family. *Proceedings of the National Academy of Sciences of the United States of America, 92*(22), 10379–10383. https://doi.org/10.1073/pnas.92.22.10379

Kim, K. J., & Lee, H. L. (2004). Complete chloroplast genome sequences from Korean ginseng (*Panax schinseng* Nees) and comparative analysis of sequence evolution among 17 vascular plants. *DNA Research, 11*, 247–261. https://doi.org/10.1093/dnares/11.4.247

Koizumi, M., Prommintra, M., & Ohtsu, Y. (1996). *Wood apple, Limonia acidissima*: A new host for the *huanglongbing* (greening) vector, *Diaphorina citri*. In J. V. da Graca, P. Moreno, & R. K. Yokomi (Eds.), *Proceedings of the Thirteenth Conference of the International Organization of Citrus Virologists* (pp. 271–275). IOCV.

Kool, A., De Boer, H. J., Krüger, A., Rydberg, A., Abbad, A., Björkörk, L., et al. (2012). Molecular identification of commercialized medicinal plants in southern Morocco. *PLoS One, 7*, e39459. https://doi.org/10.1371/journal.pone.0039459

Kress, W. J., & Erickson, D. L. (2007). A two-locus global DNA barcode for land plants: The coding *rbcL* gene complements the non-coding *trnH-psbA* spacer region. *PLoS One, 2*, e508. https://doi.org/10.1371/journal.pone.0000508

Kwak, J. M., Mori, I. C., Pei, Z. M., Leonhardt, N., Torres, M. A., Dangl, J. L., et al. (2003). NADPH oxidase *AtrbohD* and *AtrbohF* genes function in ROS-dependent ABA signaling in *Arabidopsis*. *EMBO Journal, 22*(11), 2623–2633.

Laemmli, U. K. (1970). Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nature, 227*(5259), 680–685. https://doi.org/10.1038/227680a0

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Lee, D. J., Lee, J., Jang, H. A., Ferrandon, D., & Lee, B. L. (2017). An antimicrobial protein of the *Riptortus pedestris* salivary gland was cleaved by a virulence factor of *Serratia marcescens*. *Developmental & Comparative Immunology, 67*, 427–433. https://doi.org/10.1016/j.dci.2016.08.009

León, J., Lawton, M. A., & Raskin, I. (1995). Hydrogen peroxide stimulates salicylic acid biosynthesis in tobacco. *Plant Physiology*, *108*(4), 1673–1678. https://doi.org/10.1104/pp.108.4.1673

Leong, S. S., Leong, S. C. T., & Beattie, G. A. C. (2022). Integrated pest management strategies for Asian citrus psyllid *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae) and Huanglongbing in citrus for Sarawak, East Malaysia, Borneo. *Insects, 13*, 960.

Les, D. H., Garvin, D. K., & Wimpee, C. F. (1993). Phylogenetic studies in the monocot subclass *Alismatidae*: Evidence for a reappraisal of the aquatic order *Najadales*. *Molecular Phylogenetics and Evolution, 2*(4), 304–314.

Lestiyani A, Joko T, Holford P, Beattie GAC, Donovan N, Mo J, et al. Natural infection of Murraya paniculata and Murraya sumatrana with Candidatus Liberibacter asiaticus in Java. Plant Dis. 2024;108(9):2760–70. https://doi.org/10.1094/PDIS-12-23-2593-RE.

Li, C., Zhao, Y., Xu, Z., Yang, G., Peng, J., & Peng, X. (2020). Initial characterization of the chloroplast genome of *Vicia sepium*, an important wild resource plant, and related inferences about its evolution. *Frontiers in Genetics, 11*, 73. https://doi.org/10.3389/fgene.2020.00073

Li, D., Zhu, G., Xu, Y., Ye, Y., & Liu, J. (2020). Complete chloroplast genomes of three medicinal *Alpinia* species: Genome organization, comparative analyses, and phylogenetic relationships in family *Zingiberaceae*. *Plants, 9*(2), 286. https://doi.org/10.3390/plants9020286

Li, J., Pang, Z., Trivedi, P., Zhou, X., Ying, X., Jia, H., & Wang, N. (2017). *Candidatus Liberibacter asiaticus* encodes a functional salicylic acid (SA) hydroxylase that degrades SA to suppress plant defenses. *Molecular Plant-Microbe Interactions*, *30*(8), 620–630. https://doi.org/10.1094/mpmi-12-16-0257-r

Li, M., & Kim, C. (2022). Chloroplast ROS and stress signaling. *Plant Communications, 3*(1), 100264. https://doi.org/10.1016/j.xplc.2021.100264

Li, T., & Ke, C. (2002). Detection of the bearing rate of *Liberobacter asiaticum* in the citrus psylla and its host plant *Murraya paniculata* by nested PCR. *Acta Phytophylacica Sinica, 29*(1), 31–35.

Liao, L., Cao, S. Y., Rong, Y., & Wang, Z. H. (2016). Effects of grafting on key photosynthetic enzymes and gene expression in the citrus cultivar Huangguogan. *Genetics and Molecular Research, 15*(1), Article gmr.15017690. https://doi.org/10.4238/gmr.15017690

Librado, P., & Rozas, J. (2009). DnaSP v5: A software for comprehensive analysis of DNA polymorphism data. *Bioinformatics, 25*(11), 1451–1452. https://doi.org/10.1093/bioinformatics/btp187

Lin, H., Han, C. S., Liu, B., Lou, B., Bai, X., Deng, C., Civerolo, E. L., & Gupta, G. (2013). Complete genome sequence of a Chinese strain of *Candidatus*

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Liberibacter asiaticus. *Genome Announcements, 1*(2). https://doi.org/10.1128/genomeA.00184-13

Liu, H., Zhao, Y., Zhou, J., Ma, Q., Wang, X., & Hua, Z. (2020). Complete chloroplast genome sequence of *Murraya paniculata* (Rutaceae): A widely used folk medicinal herb. *Mitochondrial DNA Part B: Resources, 5*(3), 3678–3679. https://doi.org/10.1080/23802359.2020.1829518

Livak, K. J., & Schmittgen, T. D. (2001). Analysis of relative gene expression data using real-time quantitative PCR and the 2(-ΔΔC(T)) method. *Methods, 25*(4), 402–408. https://doi.org/10.1006/meth.2001.1262

Long, Q., Xie, Y., He, Y., Li, Q., Zou, X., & Chen, S. (2019). Abscisic acid promotes jasmonic acid accumulation and plays a key role in citrus canker development. *Frontiers in Plant Science, 10*, 1634.

Lopes, S. A., Frare, G. F., Camargo, L. E. A., Wulff, N. A., Teixeira, D. C., Bassanezi, R. B., Beattie, G. A. C., & Ayres, A. J. (2010). Liberibacters associated with orange jasmine in Brazil: Incidence in urban areas and relatedness to citrus liberibacters. *Plant Pathology, 59*, 1044–1053.

Lopes, S. A., Martins, E. C., & Frare, G. F. (2005). Detecção de *Candidatus Liberibacter americanus* em *Murraya paniculata*. *Summa Phytopathologica, 31*(1), 48–49.

Ma, Q., Li, S., Bi, C., Hao, Z., Sun, C., & Ye, N. (2017). Complete chloroplast genome sequence of a major economic species, *Ziziphus jujuba* (Rhamnaceae). *Current Genetics, 63*(1), 117–129. https://doi.org/10.1007/s00294-016-0612-4

Ma, W., Pang, Z., Huang, X., Xu, J., Pandey, S. S., Li, J., Achor, D. S., Vasconcelos, F. N. C., Hendrich, C., Huang, Y., Wang, W., Lee, D., Stanton, D., & Wang, N. (2022). Citrus Huanglongbing is a pathogen-triggered immune disease that can be mitigated with antioxidants and gibberellin. *Nature Communications*, *13*, 529. https://doi.org/10.1038/s41467-022-28189-9

Mader, M., Pakull, B., Blanc-Jolivet, C., Paulini-Drewes, M., Bouda, Z., Degen, B., et al. (2018). Complete chloroplast genome sequences of four Meliaceae species and comparative analyses. *International Journal of Molecular Sciences, 19*(3), 701. https://doi.org/10.3390/ijms19030701

Maeda, H., & Morihara, K. (1995). Serralysin and related bacterial proteinases. *Methods in Enzymology, 248*, 395–413. https://doi.org/10.1016/0076-6879(95)48026-X

Mafra, V., Martins, P. K., Francisco, C. S., Ribeiro-Alves, M., Freitas-Astua, J., & Machado, M. A. (2013). *Candidatus Liberibacter americanus* induces significant reprogramming of the transcriptome of the susceptible citrus genotype. *BMC Genomics, 14*, 247. https://doi.org/10.1186/1471-2164-14-247

Mallet, J. (2005). Hybridization as an invasion of the genome. *Trends in Ecology & Evolution, 20*(5), 229–237. https://doi.org/10.1016/j.tree.2005.02.010

Martinelli, F., Uratsu, S. L., Albrecht, U., Reagan, R. L., Phu, M. L., et al. (2012). Transcriptome profiling of citrus fruit response to Huanglongbing disease. *PLoS ONE, 7*(5), e38039. https://doi.org/10.1371/journal.pone.0038039

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Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Masaoka, Y., Pustika, A., Subandiyah, S., Okada, A., Hanundin, E., Purwanto, B., Okuda, M., et al. (2011). Lower concentrations of microelements in leaves of citrus infected with *Candidatus Liberibacter asiaticus*. *Japan Agricultural Research Quarterly, 45*(3), 269–275.

Matos, L., Hilf, M. E., & Camejo, J. (2009). First report of *Candidatus Liberibacter asiaticus* associated with citrus Huanglongbing in the Dominican Republic. *Plant Disease, 93*(6), 668. https://doi.org/10.1094/PDIS-93-6-0668A

Meng, X., Xian, Y., Xiang, L., Zhang, D., Shi, Y., Wu, M., et al. (2018). Complete chloroplast genomes from *Sanguisorba*: Identity and variation among four species. *Molecules, 23*(9), 2137. https://doi.org/10.3390/molecules23092137

Millen, R. S., Olmstead, R. G., Adams, K. L., Palmer, J. D., Lao, N. T., Heggie, L., Kavanagh, T. A., Hibberd, J. M., Gray, J. C., Morden, C. W., Calie, P. J., Jermiin, L. S., & Wolfe, K. H. (2001). Many parallel losses of *infA* from chloroplast DNA during angiosperm evolution with multiple independent transfers to the nucleus. *The Plant Cell, 13*(3), 645–658. https://doi.org/10.1105/tpc.13.3.645

Mittler, R. (2002). Oxidative stress, antioxidants and stress tolerance. *Trends in Plant Science, 7*(9), 405–410. https://doi.org/10.1016/S1360-1385(02)02312-9

Mittler, R., Zandalinas, S. I., & Fichman, Y. (2022). Reactive oxygen species signalling in plant stress responses. *Nature Reviews Molecular Cell Biology, 23*, 663–679. https://doi.org/10.1038/s41580-022-00499-2

Miyakawa, T. (1980). Experimentally-induced symptoms and host range of citrus likubin (greening disease). *Annals of the Phytopathological Society of Japan, 46*(2), 224–230.

Miyakawa, T., & Yuan, Z. X. (1990). Citrus host range of greening disease. In B. Aubert, S. Tontyaporn, & D. Buangsuwon (Eds.), *Proceedings of the 4th International Asia Pacific Conference on Citrus Rehabilitation* (pp. 118–121). FAO-UNDP.

Morales, J., Kadota, Y., Zipfel, C., Molina, A., & Torres, M. A. (2016). The Arabidopsis NADPH oxidases RbohD and RbohF display differential expression patterns and contributions during plant immunity. *Journal of Experimental Botany, 67*, 1663–1676. https://doi.org/10.1093/jxb/erv558

Moss, C. B., Grogan, K., Farnsworth, D., & Vanbruggen, A. (2014). The economic cost of *Huanglongbing* (*Citrus Greening*) to Florida's orange industry: Estimates of producer and consumer surplus. *University of Florida, Food and Resource Economics Department, Working Paper*. http://ricardo.ifas.ufl.edu/papers/GreeningGMM09-11-14.pdf

Mou, F. J., Peng, Y., Li, Y. G., & Hu, X. (2021). Taxonomic revision of *Murraya* J. Koenig (Rutaceae) based on the molecular phylogeny and morphological characters. *Taiwania, 66*, 387–397. https://doi.org/10.6165/tai.2021.66.387

Munemasa, S., Hirao, Y., Tanami, K., Mimata, Y., Nakamura, Y., & Murata, Y. (2019). Ethylene inhibits methyl jasmonate-induced stomatal closure by modulating guard cell slow-type anion channel activity via the OPEN

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

STOMATA 1/SnRK2.6 kinase-independent pathway in *Arabidopsis*. *Plant & Cell Physiology, 60*(10), 2263–2271. https://doi.org/10.1093/pcp/pcz121

Nariani, T. K. (1982). Integrated approach to control citrus greening disease in India. *Proceedings of the International Society of Citriculture, 1*, 471–472.

Nazar, R., Khan, M. I., Iqbal, N., Masood, A., & Khan, N. A. (2014). Involvement of ethylene in reversal of salt-inhibited photosynthesis by sulfur in mustard. *Physiologia Plantarum, 152*(2), 331–344. https://doi.org/10.1111/ppl.12173

Nazar, R., Umar, S., & Khan, N. A. (2015). Exogenous salicylic acid improves photosynthesis and growth through increase in ascorbate-glutathione metabolism and S assimilation in mustard under salt stress. *Plant Signaling & Behavior, 10*(e1003751). https://doi.org/10.1111/j.1365-3040.2009.02041.x

Nei, M., & Roychoudhury, A. K. (1975). Sampling variances of heterozygosity and genetic distance. *Genetics, 80*(1), 223–226. https://doi.org/10.1093/genetics/80.1.223

Neubig, K. M., Whitten, W. M., Carlsward, B. S., Blanco, M. A., Endara, L., Williams, N. H., & Moore, M. (2008). Phylogenetic utility of *ycf1* in orchids: A plastid gene more variable than *matK*. *Faculty Research & Creative Activity, 257*.

Nguyen, C. H., Beattie, G. A. C., Haigh, A. M., Astuti, I. P., Mabberley, D. J., Weston, P. H., et al. (2019). Molecular differentiation of the *Murraya paniculata* complex (Rutaceae: Aurantioideae: Aurantieae). *BMC Evolutionary Biology, 19*, 236. https://doi.org/10.1186/s12862-019-1555-4

Nobori, T., Velásquez, A. C., Wu, J., Kvitko, B. H., Kremer, J. M., Wang, Y., et al. (2018). Transcriptome landscape of a bacterial pathogen under plant immunity. *Proceedings of the National Academy of Sciences of the United States of America, 115*(13), E3055–E3064.

Ohyama, K., Fukuzawa, H., Kohchi, T., Shirai, H., Sano, T., Sano, S., et al. (1986). Chloroplast gene organization deduced from complete sequence of liverwort *Marchantia polymorpha* chloroplast DNA. *Nature, 322*, 572–574. https://doi.org/10.1038/322572a0

Oxelman, B., Liden, M., & Berglund, D. (1997). Chloroplast *rps16* intron phylogeny of the tribe *Sileneae* (Caryophyllaceae). *Plant Systematics and Evolution, 206*(1–4), 393–410.

Palma, F., López-Gómez, M., Tejera, N. A., & Lluch, C. (2013). Salicylic acid improves the salinity tolerance of *Medicago sativa* in symbiosis with *Sinorhizobium meliloti* by preventing nitrogen fixation inhibition. *Plant Science, 208*, 75–82. https://doi.org/10.1016/j.plantsci.2013.03.015

Palmer, J. D. (1987). Chloroplast DNA evolution and biosystematic uses of chloroplast DNA variation. *The American Naturalist, 130*(S1), S6–S29.

Palmer, J. D., Jansen, R. K., Michaels, H. J., Chase, M. W., & Manhart, J. R. (1988). Chloroplast DNA variation and plant phylogeny. *Annals of the Missouri Botanical Garden, 75*, 1180–1206.

Patel, M., Siegel, A. J., & Berry, J. O. (2006). Untranslated regions of *FbRbcS1* mRNA mediate bundle sheath cell-specific gene expression in leaves of a

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Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

C4 plant. *Journal of Biological Chemistry, 281*(33), 25485–25491. https://doi.org/10.1074/jbc.M604162200

Patt, J. M., & Sétamou, M. (2010). Responses of the Asian citrus psyllid to volatiles emitted by the flushing shoots of its rutaceous host plants. *Environmental Entomology, 39*(2), 618–624. https://doi.org/10.1603/en09216

Pel, M. J., van Dijken, A. J., Bardoel, B. W., Seidl, M. F., van der Ent, S., van Strijp, J. A., & Pieterse, C. M. J. (2014). *Pseudomonas syringae* evades host immunity by degrading flagellin monomers with alkaline protease AprA. *Molecular Plant-Microbe Interactions, 27*(7), 603–610. https://doi.org/10.1094/MPMI-02-14-0032-R

Pieterse, C. M. J., Van der Does, D., Zamioudis, C., Leon-Reyes, A., & Van Wees, S. C. M. (2012). Hormonal modulation of plant immunity. *Annual Review of Cell and Developmental Biology, 28*, 489–521. https://doi.org/10.1146/annurev-cellbio-092910-154055

Pitino, M., Armstrong, C. M., Cano, L. M., & Duan, Y. (2016). Transient expression of *Candidatus Liberibacter asiaticus* effector induces cell death in *Nicotiana benthamiana*. *Frontiers in Plant Science, 7*, 982. https://doi.org/10.3389/fpls.2016.00982

Portis, A. R. Jr. (2003). Rubisco activase – Rubisco's catalytic chaperone. *Photosynthesis Research, 75*, 11–27. https://doi.org/10.1023/A:1022466211611

Prasad, S., Xu, J., Zhang, Y., & Wang, N. (2016). SEC-translocon dependent extracytoplasmic proteins of *Candidatus Liberibacter asiaticus*. *Frontiers in Microbiology, 7*, 1989. https://doi.org/10.3389/fmicb.2016.01989

Pustika, A. B., Subandiyah, S., Holford, P., Beattie, G. A. C., Iwanami, T., & Masaoka, Y. (2008). Interactions between plant nutrition and symptom expression in mandarin trees infected with the disease huanglongbing. *Australian Plant Disease Notes, 3*, 112–115. https://doi.org/10.1071/DN08056

Qiu, Z., Guo, J., Zhu, A., Zhang, L., & Zhang, M. (2014). Exogenous jasmonic acid can enhance tolerance of wheat seedlings to salt stress. *Ecotoxicology and Environmental Safety, 104*, 202–208. https://doi.org/10.1016/j.ecoenv.2014.03.014

Rao, A. C. S., Somayajulu, D., & Banka, H. (2012). Modified correlation-based technique in microarray data analysis for searching differentially expressed genes. *Proceedings of the 2012 1st International Conference on Recent Advances in Information Technology (RAIT)*. https://doi.org/10.1109/rait.2012.6194615

Rao, M. V., Paliyath, G., Ormrod, D. P., Murr, D. P., & Watkins, C. B. (1997). Influence of salicylic acid on H_2O_2 production, oxidative stress, and H_2O_2-metabolizing enzymes: Salicylic acid-mediated oxidative damage requires H_2O_2. *Plant Physiology, 115*(1), 137–149. https://doi.org/10.1104/pp.115.1.137

Rathi, S., McFeeters, H., McFeeters, R. L., & Davis, M. R. (2012). Purification and Phytotoxic Analysis of Botrytis cinerea Virulence Factors: New Avenues

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Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

for Crop Protection. Agriculture, 2(3), 154–164. doi:10.3390/agriculture2030154

Raubeson, L. A., Peery, R., Chumley, T. W., Dziubek, C., Fourcade, H. M., Boore, J. L., & Jansen, R. K. (2007). Comparative chloroplast genomics: Analyses including new sequences from the angiosperms *Nuphar advena* and *Ranunculus macranthus*. *BMC Genomics, 8*, 174. https://doi.org/10.1186/1471-2164-8-174

Rauscher, M., Adam, A., Wirtz, S., Guggenheim, R., Mendgen, K., & Deising, H. (1999). PR-1 protein inhibits the differentiation of rust infection hyphae in leaves of acquired resistant broad bean. *The Plant Journal, 19*(6), 625–633. https://doi.org/10.1046/j.1365-313x.1999.00557.x

Raven, J. A. (2013). Rubisco: Still the most abundant protein on Earth? *New Phytologist, 198*(1), 1–3. https://doi.org/10.1111/nph.12197

Raven, P. (1980). Hybridization and the nature of species in higher plants. *Canadian Botanical Association Bulletin, 13*, 3–10.

Ravindran, A., Saenkham, P., Levy, J., Tamborindeguy, C., Lin, H., Gross, D. C., & Pierson, E. (2018). Characterization of the serralysin-like gene of *Candidatus Liberibacter solanacearum* associated with potato zebra chip disease. *Phytopathology, 108*(3), 327–335. https://doi.org/10.1094/PHYTO-07-17-0255-R

Reinking, O. A. (1919). Diseases of economic plants in southern China. *Philippine Agriculture, 8*, 109–135.

Reynaud, B., Turpin, P., Molinari, F. M., Grondin, M., Chiroleu, F., Fereres, A., & Delatte, H. (2022). The African citrus psyllid *Trioza erytreae*: An efficient vector of *Candidatus Liberibacter asiaticus*. *Frontiers in Plant Science, 13*, 1089762. https://doi.org/10.3389/fpls.2022.1089762

Roxburgh, W. (1832). *Flora Indica: Descriptions of Indian Plants* (Vol. II). W. Thacker and Co.

Sakamoto, M., Munemura, I., Tomita, R., & Kobayashi, K. (2008). Involvement of hydrogen peroxide in leaf abscission signaling, revealed by analysis with an in vitro abscission system in *Capsicum* plants. *The Plant Journal, 56*(1), 13–27. https://doi.org/10.1111/j.1365-313X.2008.03577.x

Samuel, R., Ehrendorfer, F., Chase, M. W., & Greger, H. (2001). Phylogenetic analyses of Aurantioideae (Rutaceae) based on non-coding plastid DNA sequences and phytochemical features. *Plant Biology, 3*(1), 77–87. https://doi.org/10.1055/s-2001-11851

Schwarz, E. N., Ruhlman, T. A., Sabir, J. S. M., Hajrah, N. H., Alharbi, N. S., Almalki, A. L., et al. (2015). Plastid genome sequences of legumes reveal parallel inversions and multiple losses of *rps16* in papilionoids. *Journal of Systematics and Evolution, 53*(5), 458–468. https://doi.org/10.1111/jse.12179

Scordino, M., & Sabatino, L. (2014). Characterization of polyphenolic profile of citrus fruit by HPLC/PDA/ESI/MS-MS. In R. R. Watson (Ed.), *Polyphenols in plants* (pp. 187–199). Academic Press.

Shan, L., He, P., Li, J., Heese, A., Peck, S. C., Nürnberger, T., et al. (2008). Bacterial effectors target the common signaling partner BAK1 to disrupt

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

multiple MAMP receptor-signaling complexes and impede plant immunity. *Cell Host & Microbe, 4*(1), 17–27. https://doi.org/10.1016/j.chom.2008.05.017

Sharma, B. D., Hore, D. K., & Gupta, S. G. (2004). Genetic resources of *Citrus* of northeastern India and their potential use. *Genetic Resources and Crop Evolution, 51*, 411–418. https://doi.org/10.1023/B:GRES.0000023454.76009.54

Shaw, J., Lickey, E. B., Beck, J. T., Farmer, S. B., Liu, W., Miller, J., Siripun, K. C., Winder, C. T., Schilling, E. E., & Small, R. L. (2005). The tortoise and the hare II: Relative utility of 21 non-coding chloroplast DNA sequences for phylogenetic analysis. *American Journal of Botany, 92*(1), 142–166. https://doi.org/10.3732/ajb.92.1.142

Shinozaki, K., Ohme, M., Tanaka, M., Wakasugi, T., Hayashida, N., Matsubayashi, T., et al. (1986). The complete nucleotide sequence of the tobacco chloroplast genome: Its gene organization and expression. *Plant Molecular Biology Reporter, 5*, 2043–2049. https://doi.org/10.1002/j.1460-2075.1986.tb04464.x

Shivakumar, V. S., Appelhans, M. S., Johnson, G., Carlsen, M., & Zimmer, E. A. (2017). Analysis of whole chloroplast genomes from the genera of the Clauseneae, the curry tribe (Rutaceae, *Citrus* family). *Molecular Phylogenetics and Evolution, 117*, 135–140. https://doi.org/10.1016/j.ympev.2016.12.015

Slatko, B. E., Gardner, A. F., & Ausubel, F. M. (2018). Overview of next-generation sequencing technologies. *Current Protocols in Molecular Biology, 122*(1), e59. https://doi.org/10.1002/cpmb.59

Song, Z., Zhao, L., Ma, W., Peng, Z., Shi, J., Pan, F., Gao, Y., Sui, X., Rengel, Z., Chen, Q., & Wang, B. (2023). Ethylene inhibits ABA-induced stomatal closure via regulating *NtMYB184*-mediated flavonol biosynthesis in tobacco. *Journal of Experimental Botany, 74*(21), 6735-6748. https://doi.org/10.1093/jxb/erad308

Sonoike, K. (1996). Degradation of *psaB* gene product, the reaction center subunit of photosystem I, is caused during photoinhibition of photosystem I: Possible involvement of active oxygen species. *Plant Science, 115*(2), 157–164. https://doi.org/10.1016/0168-9452(96)04341-5

Souri, Z., Karimi, N., Farooq, M. A., & Sandalio, L. M. (2020). Nitric oxide improves tolerance to arsenic stress in *Isatis cappadocica* Desv. shoots by enhancing antioxidant defenses. *Chemosphere, 239*, 124523. https://doi.org/10.1016/j.chemosphere.2019.124523

Stancu, M. M. (2016). Highly solvent tolerance in *Serratia marcescens* IBBPo15. *Brazilian Archives of Biology and Technology, 59*, e16150231. https://doi.org/10.1590/1678-4324-2016150231

Sugio, A., Maclean, A. M., Kingdom, H. N., Grieve, V. M., Manimekalai, R., & Hogenhout, S. A. (2011). Diverse targets of phytoplasma effectors: From plant development to defense against insects. *Annual Review of Phytopathology, 49*, 175–195. https://doi.org/10.1146/annurev-phyto-072910-095323

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Suharti, W., Bahtiar, J., & Kharisun, K. (2021). Pengaruh ragam sumber silika terhadap pertumbuhan dan ketahanan tanaman padi terinfeksi *Rhizoctonia solani*. *Jurnal Pertanian Terpadu, 9*(1), 26-39. https://doi.org/10.36084/jpt.v9i1.297

Supriyanto, A., Dwiastuti, M. E., Triwiratno, A., Endarto, O., & Suhariyono. (2010). *Pengelolaan terpadu kebun jeruk sehat, strategi pengendalian penyakit CVPD.* Kementerian Pertanian.

Suzuki, N., Koussevitzky, S., Mittler, R., & Miller, G. (2012). ROS and redox signalling in the response of plants to abiotic stress. *Plant, Cell and Environment, 35*, 259–270.

Swingle, W. T., & Reece, R. C. (1967). The botany of *Citrus* and its wild relatives. In W. Reuther, H. J. Webber, & L. D. Batchelor (Eds.), *The Citrus Industry, Volume I, History, World Distribution, Botany, and Varieties* (pp. 190–430). Berkeley: Division of Agricultural Sciences, University of California.

Taberlet, P., Gielly, L., Pautou, G., & Bouvet, J. (1991). Universal primers for amplification of three non-coding regions of chloroplast DNA. *Plant Molecular Biology, 17*(5), 1105–1109.

Tamura, K., Stecher, G., & Kumar, S. (2021). MEGA11: Molecular evolutionary genetics analysis version 11. *Molecular Biology and Evolution, 38*(7), 3022–3027. https://doi.org/10.1093/molbev/msab120

Teixeira, D. C., Danet, J. L., Eveillard, S., & 8 other authors. (2005). *Citrus huanglongbing* in São Paulo State, Brazil: PCR detection of the *'Candidatus Liberibacter'* species associated with the disease. *Molecular and Cellular Probes, 19*(3–4), 173–179.

Teshima, N., Tsugawa, M., Tateishi, A., Tokumaru, M., Matsubara, R., Kimachi, T., Ju-ichi, M., Ito, C., & Furukawa, H. (2004). Two new bicoumarins from the leaves of *Murraya exotica*. *Heterocycles, 63*, 2837–2843.

Texeira, D. C., Ayres, J., Kitajima, E. W., Danet, L., Jagoueix-Eveillard, S., Saillard, C., & Bové, J. M. (2005). First report of a Huanglongbing-like disease of citrus in São Paulo State, Brazil, and association of a new *Liberibacter* species, *Candidatus Liberibacter americanus*, with the disease. *Plant Disease, 89*, 107.

Thevenet, D., Pastor, V., Baccelli, I., Balmer, A., Vallat, A., Neier, R., & Mauch-Mani, B. (2016). The priming molecule β-aminobutyric acid is naturally present in plants and is induced by stress. *New Phytologist, 213*(2), 552–559. https://doi.org/10.1111/nph.14298

Thompson, J. D., Higgins, D. G., & Gibson, T. J. (1994). CLUSTAL W: Improving the sensitivity of progressive multiple sequence alignment through sequence weighting, position-specific gap penalties, and weight matrix choice. *Nucleic Acids Research, 22*(22), 4673–4680. https://doi.org/10.1093/nar/22.22.4673

Tian, S., Lu, L., Labavitch, J. M., Webb, S. M., Yang, X., Brown, P. H., & He, Z. (2014). Spatial imaging of Zn and other elements in Huanglongbing-affected grapefruit by synchrotron-based micro X-ray fluorescence investigation. *Journal of Experimental Botany, 65*, 953-964.

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Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Tillich, M., Lehwark, P., Pellizzer, T., Ulbricht-Jones, E. S., Fischer, A., Bock, R., & Greiner, S. (2017). GeSeq – Versatile and accurate annotation of organelle genomes. *Nucleic Acids Research, 45*, W6–W11.

Tirtawidjaja, S. (1964). *Citrus vein-phloem degeneration virus penyebab dari citrus chlorosis di Djawa* (Disertasi Doktor, Fakultas Pertanian, Institut Pertanian Bogor).

Tomimura, K., Miyata, S., Furuya, N., Kubota, K., Okuda, M., Subandiyah, S., Hung, T. H., Su, H. J., & Iwanami, T. (2009). Evaluation of genetic diversity among *'Candidatus Liberibacter asiaticus'* isolates collected in Southeast Asia. *Phytopathology, 99*(10), 1062–1069.

Tomkins, M., Kliot, A., Marée, A. F. M., & Hogenhout, S. A. (2018). A multilayered mechanistic modelling approach to understand how effector genes extend beyond phytoplasma to modulate plant hosts, insect vectors, and the environment.

Torres, M. A., & Dangl, J. L. (2005). Functions of the respiratory burst oxidase in biotic interactions, abiotic stress, and development. *Current Opinion in Plant Biology, 8*, 397–403.

Torres, M. A., Jones, J. D. G., & Dangl, J. L. (2006). Reactive oxygen species signaling in response to pathogens. *Plant Physiology, 141*(2), 373-378. https://doi.org/10.1104/pp.106.079467

Van der Auwera, G. A., Carneiro, M. O., Hartl, C., Poplin, R., Del Angel, G., Levy-Moonshine, A., et al. (2013). From FastQ data to high confidence variant calls: The Genome Analysis Toolkit best practices pipeline. *Current Protocols in Bioinformatics, 11*(1110), 11.10.1-11.10.33.

Van Loon, L. C., Geraats, B. P. J., & Linthorst, H. J. M. (2006). Ethylene as a modulator of disease resistance in plants. *Trends in Plant Science, 11*, 184–191. https://doi.org/10.1016/j.tplants.2006.02.005

Vandeputte, D., Kathagen, G., D'Hoe, K., Vieira-Silva, S., Valles-Colomer, M., Sabino, J., Wang, J., Tito, R. Y., De Commer, L., Darzi, Y., et al. (2017). Quantitative microbiome profiling links gut community variation to microbial load. *Nature, 551*, 507–511. https://doi.org/10.1038/nature24460.

Velasco-Ramírez, A. P., Torres-Morán, M. I., Molina-Moret, S., Sánchez-González, J. J., & Santacruz-Ruvalcaba, F. (2014). Efficiency of RAPD, ISSR, AFLP, and ISTR markers for the detection of polymorphisms and genetic relationships in camote de cerro (*Dioscorea* spp.). *Electronic Journal of Biotechnology, 17*(2), 65–71. https://doi.org/10.1016/j.ejbt.2014.01.002

Verma, V., Ravindran, P., & Kumar, P. P. (2016). Plant hormone-mediated regulation of stress responses. *BMC Plant Biology, 16*, 1. https://doi.org/10.1186/s12870-016-0771-y

Vlot, A. C., Dempsey, D. A., & Klessig, D. F. (2009). Salicylic acid, a multifaceted hormone to combat disease. *Annual Review of Phytopathology, 47*, 177–206. https://doi.org/10.1146/annurev.phyto.050908.135202

Vu, M. H., Kyung, H. T., Bahk, S., Jo, Y., Kumar, R., Dhineshkumar, T., Iswanto, A. B. B., Chung, W. S., Shelake, R. M., & Kim, J.-Y. (2023). ROS-mediated plasmodesmal regulation requires a network of an *Arabidopsis*

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

receptor-like kinase, calmodulin-like proteins, and callose synthases. *Frontiers in Plant Science, 13*. https://doi.org/10.3389/fpls.2022.1107224

Waite, D. W., Liefting, L., Delmiglio, C., Chernyavtseva, A., Ha, H. J., & Thompson, J. R. (2022). Development and validation of a bioinformatic workflow for the rapid detection of viruses in biosecurity. *Viruses, 14*(10).

Walter, A. J., Duan, Y., & Hall, D. G. (2012). Titers of *Candidatus Liberibacter asiaticus* in *Murraya paniculata* and *Murraya*-reared *Diaphorina citri* are much lower than in citrus and citrus-reared psyllids. *HortScience, 47*(10), 1449–1452.

Wan, M. H., Wu, B., Ren, W., & He, B. (2010). Screening, characterization, and cloning of a solvent-tolerant protease from *Serratia marcescens* MH6. *Journal of Microbiology and Biotechnology, 20*, 881–888.

Wang, H. Q., Sun, L. P., Wang, L. X., Fang, X. W., Li, Z. Q., Zhang, F. F., Hu, X., Qi, C., & He, J. M. (2020). Ethylene mediates salicylic-acid-induced stomatal closure by controlling reactive oxygen species and nitric oxide production in *Arabidopsis*. *Plant Science, 294*, 110464.

Wang, L., Wuyun, T., Du, H., Wang, D., & Cao, D. (2016). Complete chloroplast genome sequences of *Eucommia ulmoides*: Genome structure and evolution. *Tree Genetics & Genomes, 12*, 12. https://doi.org/10.1007/s11295-016-0970-6

Wang, R., Cheng, C., Chang, C., Wu, C., Su, T., & Chaw, S. (2008). Dynamics and evolution of the inverted repeat-large single copy junctions in the chloroplast genomes of monocots. *BMC Evolutionary Biology, 8*, 36. https://doi.org/10.1186/1471-2148-8-36

Wang, Y., Pruitt, R. N., Nürnberger, T., & Wang, Y. (2022). Evasion of plant immunity by microbial pathogens. *Nature Reviews Microbiology, 20*, 449–464. https://doi.org/10.1038/s41579-022-00710-3

Wasternack, C., & Song, S. (2017). Jasmonates: Biosynthesis, metabolism, and signaling by proteins activating and repressing transcription. *Journal of Experimental Botany, 68*(6), 1303–1321. https://doi.org/10.1093/jxb/erw443

Wendel, J. F., & Doyle, J. (1998). Phylogenetic incongruence: Window into genome history and molecular evolution. In Soltis, D. E., Soltis, P. S., & Doyle, J. J. (Eds.), *Molecular systematics of plants* (pp. 265–296). Boston, MA: Kluwer Academic Publishers.

White, T. J., Bruns, T., Lee, S., & Taylor, J. (1990). Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In Innis, M. A., Gelfand, D. H., Sninsky, J. J., & White, T. J. (Eds.), *PCR protocols: A guide to methods and applications* (pp. 315–322). Academic Press.

Woodson, J. D. (2022). Control of chloroplast degradation and cell death in response to stress. *Trends in Biochemical Sciences, 47*(10), 851–864. https://doi.org/10.1016/j.tibs.2022.03.010

Wu, F., Deng, X., Liang, G., Huang, J., Cen, Y., & Chen, J. (2015). Whole-genome sequence of *Candidatus Profftella armatura* from *Diaphorina citri* in Guangdong, China. *Genome Announcements, 3*(6). https://doi.org/10.1128/genomeA.01395-15

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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Wu, H., Wu, X., Li, Z., Duan, L., & Zhang, M. (2012). Physiological evaluation of drought stress tolerance and recovery in cauliflower (*Brassica oleracea* L.) seedlings treated with methyl jasmonate and coronatine. *Journal of Plant Growth Regulation, 31*, 113–123. https://doi.org/10.1007/s00344-011-9224-x

Yan, Q., Sreedharan, A., Wei, S., Wang, J., Pelz-Stelinski, K., Folimonova, S., & Wang, N. (2013). Global gene expression changes in *Candidatus Liberibacter asiaticus* during the transmission in distinct hosts between plant and insect. *Molecular Plant Pathology, 14*(4), 391–404. https://doi.org/10.1111/mpp.12015

Yan, Z., Wang, S., Ma, D., Liu, B., Lin, H., & Li, S. (2019). Meteorological factors affecting pan evaporation in the Haihe River Basin and China. *Water, 11*, 317. https://doi.org/10.3390/w11020317

Yang, M., Zhang, X., Liu, G., Yin, Y., Chen, K., Yun, Q., et al. (2010). The complete chloroplast genome sequence of date palm (*Phoenix dactylifera* L.). *PLoS One, 5*, e12762. https://doi.org/10.1371/journal.pone.0012762

Yang, Y., Huang, M., Beattie, G. A. C., Xia, Y., Ouyang, G., & Xiong, J. (2006). Distribution, biology, ecology and control of the psyllid *Diaphorina citri* Kuwayama, a major pest of citrus: A status report for China. *International Journal of Pest Management, 52*, 343–352. https://doi.org/10.1080/09670870600872919

Yasuda, K., Kawamura, F., & Oishi, T. (2005). Location and preference of adult Asian citrus psyllid, *Diaphorina citri* (Homoptera: Psyllidae) on Chinese box orange jasmine, *Murraya exotica* L., and flat lemon, *Citrus depressa*. *Japanese Journal of Applied Entomology and Zoology, 49*(3), 146–149. https://doi.org/10.1303/jjaez.2005.146

Yiallouros, I., Grosse Berckhoff, E., & Stöcker, W. (2000). The roles of Glu93 and Tyr149 in astacin-like zinc peptidases. *FEBS Letters, 484*, 224–228. https://doi.org/10.1016/S0014-5793(00)02142-8

Yoon, S. H., Ha, S.-M., Lim, J., Kwon, S., Chun, J., & others. (2017). A large-scale evaluation of algorithms to calculate average nucleotide identity. *Antonie van Leeuwenhoek, 110*, 1281–1286. https://doi.org/10.1007/s10482-017-0844-4

Yu, X., Lund, S. P., Scott, R. A., Greenwald, J. W., Records, A. H., Nettleton, D., et al. (2013). Transcriptional responses of *Pseudomonas syringae* to growth in epiphytic versus apoplastic leaf sites. *Proceedings of the National Academy of Sciences of the United States of America, 110*(5), E425–E434. https://doi.org/10.1073/pnas.1219864110

Yule, G. U. (1925). A mathematical theory of evolution, based on the conclusions of Dr. J. C. Willis, F. R. S. *Philosophical Transactions of the Royal Society of London. Series B, 213*(402–410), 21–87. https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.1925.0002

Zhang, D. X., Hartley, T. G., & Mabberley, D. J. (2008). Rutaceae. In Wu, Z. Y., Raven, P. H., & Hong, D. Y. (Eds.), *Flora of China, Vol. 11 (Oxalidaceae through Aceraceae)* (pp. 51–98). Beijing: Science Press; St. Louis: Missouri Botanical Garden Press.

UNIVERSITAS GADJAH MADA
Identification of Citrus Relative, Muraya spp. and the Gene Expression Analysis on Citrus and Muraya against Serralysin Toxin of Candidatus Liberibacter asiaticus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Zhang, Y., Fan, W., Kinkema, M., Li, X., & Dong, X. (1999). Interaction of NPR1 with basic leucine zipper protein transcription factors that bind sequences required for salicylic acid induction of the PR-1 gene. *Proceedings of the National Academy of Sciences, 96*(11), 6523–6528. https://doi.org/10.1073/pnas.96.11.6523

Zhang, Y., Zhang, Y., Sun, Q., Lu, S., Chai, L., Ye, J., & Deng, X. (2021). Citrus transcription factor CsHB5 regulates abscisic acid biosynthetic genes and promotes senescence. *The Plant Journal, 108*(1), 151–168. https://doi.org/10.1111/tpj.15494

Zhao, H., Sun, R., Albrecht, U., Padmanabhan, C., Wang, A., Coffey, M. D., et al. (2013). Small RNA profiling reveals phosphorus deficiency as a contributing factor in symptom expression for citrus huanglongbing disease. *Molecular Plant, 6*, 301–310. https://doi.org/10.1093/mp/sst012

Zhao, P., Luo, J., & Zhuang, W. (2011). DNA barcoding of the fungal genus *Neonectria* and the discovery of two new species. *Science China Life Sciences, 54*, 664–674. https://doi.org/10.1007/s11427-011-4184-8

Zheng, Y., Li, J., Zheng, M., Li, Y., Deng, X., & Zheng, Z. (2024). Whole genome sequences of 135 *Candidatus Liberibacter asiaticus* strains from China. *Scientific Data, 11*, 1018. https://doi.org/10.1038/s41597-024-03855-3

Zhong, Y., Cheng, C. Z., Jiang, N. H., Jiang, B., Zhang, Y. Y., Wu, B., et al. (2015). Comparative transcriptome and iTRAQ proteome analyses of citrus root responses to *Candidatus Liberibacter asiaticus* infection. *PLoS One, 10*, e0126973. https://doi.org/10.1371/journal.pone.0126973

Zhou, L. J., Gabriel, D. W., Duan, Y. P., Halbert, S. E., & Dixon, W. N. (2007). First report of dodder transmission of huanglongbing from naturally infected *Murraya paniculata* to citrus. *Plant Disease, 91*, 227. https://doi.org/10.1094/PDIS-91-2-0227C

Zhou, L., Powell, C. A., Hoffman, M. T., Li, W., Fan, G., Liu, B., Lin, H., & Duan, Y. (2011). Diversity and plasticity of the intracellular plant pathogen and insect symbiont *Candidatus Liberibacter asiaticus* as revealed by hypervariable prophage genes with intragenic tandem repeats. *Applied and Environmental Microbiology, 77*(18), 6663–6673. https://doi.org/10.1128/AEM.05119-11

Zhu, Y., Su, H., Liu, X. X., et al. (2024). Identification of NADPH oxidase genes crucial for rice multiple disease resistance and yield traits. *Rice, 17*, 1. https://doi.org/10.1186/s12284-023-00678-5

Zuckerkandl, E., & Pauling, L. (1965). Evolutionary divergence and convergence in proteins. In V. Bryson & H. J. Vogel (Eds.), *Evolving genes and proteins* (pp. 97–166). Academic Press. https://bip.weizmann.ac.il/education/course/evogen/Clocks/Zuckerkandl_1965.pdf