UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Abad, U., Sassi, M., & Traas, J. 2017. Flower development: From morphodynamics to morphomechanics. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 372(1720). https://doi.org/10.1098/rstb.2015.0545

Adhikari, P. B., & Kasahara, R. D. 2024. An Overview on MADS Box Members in Plants: A Meta-Review. *International Journal of Molecular Sciences*. 25(15). https://doi.org/10.3390/ijms25158233

Adi, B. N., & Susanti, S. 2020. Struktur Anatomis Ovarium Dan Perkembangan Buah Adas (*Foeniculum vulgare* Mill.). *Bioeksperimen: Jurnal Penelitian Biologi*, 6(2): 68–75. https://doi.org/10.23917/bioeksperimen.v6i2.8909

Ahuja, I., Kissen, R., & Bones, A. M. 2012. Phytoalexins in defense against pathogens. *Trends in Plant Science*. 17(2): 73–90. https://doi.org/10.1016/j.tplants.2011.11.002

Alberto, F., Bignon, C., Sulzenbacher, G., Henrissat, B., & Czjzek, M. 2004. The Three-dimensional Structure of Invertase (β-Fructosidase) from Thermotoga maritima Reveals a Bimodular Arrangement and an Evolutionary Relationship between Retaining and Inverting Glycosidases. *Journal of Biological Chemistry*. 279(18): 18903–18910. https://doi.org/10.1074/jbc.M313911200

Álvarez-Flórez, F., López-Cristoffanini, C., Jáuregui, O., Melgarejo, L. M., & López-Carbonell, M. 2017. Changes in ABA, IAA and JA levels during calyx, fruit and leaves development in cape gooseberry plants (*Physalis peruviana* L.). *Plant Physiology and Biochemistry*. 115: 174–182. https://doi.org/10.1016/j.plaphy.2017.03.024

Amirul-Aiman, A. J., Noraini, T., Nurul-Aini, C. A. C., & Ruzi, A. R. 2013. Petal anatomy of four *Justicia* (Acanthaceae) species. *AIP Conference Proceedings*. 1571: 368–371. https://doi.org/10.1063/1.4858685

An, J., Kim, S. H., Bahk, S., Vuong, U. T., Nguyen, N. T., Do, H. L., Kim, S. H., & Chung, W. S. 2021. Naringenin Induces Pathogen Resistance Against Pseudomonas syringae Through the Activation of NPR1 in *Arabidopsis*. *Frontiers in Plant Science*. 12. https://doi.org/10.3389/fpls.2021.672552

Andreychuk, R. R., Kolomiychuk, V. P., & Odintsova, A. V. 2020. Morpho-anatomical structure and development of fruit in *Asyneuma canescens* (Campanulaceae). *Regulatory Mechanisms in Biosystems*. 11(4): 513–519. https://doi.org/10.15421/022078

April, A. P., & Mackenzie, R. J. 2018. *RNA-Seq : Basics, Applications and Protocol*. Technology Networks, all rights reserved, Part of the LabX Media Group.

Araújo, W. L., Nunes-Nesi, A., & Fernie, A. R. 2011. Fumarate: Multiple functions of a simple metabolite. *Phytochemistry*. 72(9): 838–843.

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

https://doi.org/10.1016/j.phytochem.2011.02.028

Åstrand, J., Knight, C., Robson, J., Talle, B., & Wilson, Z. A. 2021. Evolution and diversity of the angiosperm anther: trends in function and development. *Plant Reproduction*, 34(4): 307–319. https://doi.org/10.1007/s00497-021-00416-1

Ávalos García, A., & Pérez-Urria Carril, E. 2009. Metabolismo secundario de plantas. *Reduca (Biología). Serie Fisiología Vegetal*. 2(3): 119–145.

Azlan, G. J., Marziah, M., Radzali, M., & Johari, R. 2005. Accumulation of physalin in cells and tissues of *Physalis minima* L. *Acta Horticulturae.* 676: 53–59. https://doi.org/10.17660/ActaHortic.2005.676.5

Babbar, N. 2015. An introduction alkaloids and their applications in pharmaceutical chemistry. *The Pharma Innovation Journal*. 4(10): 74–75. www.thepharmajournal.com

Balbi, V., & Lomax, T. L. 2003. Regulation of early tomato fruit development by the Diageotropica gene. *Plant Physiology*. 131(1): 186–197. https://doi.org/10.1104/pp.010132

Baumann, T. W., & Meier, C. M. 1993. Chemical defence by withanolides during fruit development in *Physalis peruviana*. *Phytochemistry*. 33(2): 317–321. https://doi.org/10.1016/0031-9422(93)85510-X

Beart, J. E., Lilley, T. H., & Haslam, E. 1985. Plant polyphenols-secondary metabolism and chemical defence: Some observations. *Phytochemistry*. 24(1): 33–38. https://doi.org/10.1016/S0031-9422(00)80802-X

Ben-Halbritter, H., Ulrich, S., BGrímsson, F., Weber, M., Zetter, R., Hesse, M., Buchner, R., Svojtka, M., & Frosch-Radivo, A. 2018. *Illustrated Pollen Terminology, Second Edition*. https://doi.org/10.1007/978-3-319-71365-6

Berdy, J. 2005. Bioactive Microbial Metabolites, a Personal View. *Journal of Antibiotics.* 58: 1-26. http://dx.doi.org/10.1038/ja.2005.1

Berini, J. L., Brockman, S. A., Hegeman, A. D., Reich, P. B., Muthukrishnan, R., Montgomery, R. A., & Forester, J. D. 2018. Combinations of abiotic factors differentially alter production of plant secondary metabolites in five woody plant species in the boreal-temperate transition zone. *Frontiers in Plant Science*. https://doi.org/10.3389/fpls.2018.01257

Bhat, N. A., Jeri, L., Mipun, P., & Kumar, Y. 2018. Systematic studies (micro-morphological, leaf architectural, anatomical and palynological) of genus *Physalis* (solanaceae) in northeast India. *Plant Archives*. 18(2): 2229–2238.

Bhojwani, S.S., and S. P. Bathnagar. 1979. *The Embryology of Angiosperms*. Vikas Publishing House.

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Borghi, M., de Souza, L. P., Tohge, T., Mi, J., Melandri, G., Proost, S., Martins, M. C. M., Al-Babili, S., Bouwmeester, H. J., & Fernie, A. R. 2022. High-energy-level metabolism and transport occur at the transition from closed to open flowers. *Plant Physiology*. 190(1): 319–339. https://doi.org/10.1093/plphys/kiac253

Borghi, M., & Fernie, A. R. 2017. Floral metabolism of sugars and amino acids: Implications for pollinators' preferences and seed and fruit set. *Plant Physiology*. 175(4): 1510–1524. https://doi.org/10.1104/pp.17.01164

Breitel, D., Brett, P., Alseekh, S., Fernie, A. R., Butelli, E., & Martin, C. 2021. Metabolic engineering of tomato fruit enriched in L-DOPA. *Metabolic Engineering*. 65:185–196. https://doi.org/10.1016/j.ymben.2020.11.011

Brewer, M. T., Moyseenko, J. B., Monforte, A. J., & Van Der Knaap, E. 2007. Morphological variation in tomato: A comprehensive study of quantitative trait loci controlling fruit shape and development. *Journal of Experimental Botany*. 58(6): 1339–1349. https://doi.org/10.1093/jxb/erl301

Brukhin, V., Hernould, M., Gonzalez, N., Chevalier, C., & Mouras, A. 2003. Flower development schedule in tomato *Lycopersicon esculentum* cv. sweet cherry. *Sexual Plant Reproduction*. 15(6): 311–320. https://doi.org/10.1007/s00497-003-0167-7

Bryksová, M. 2020. *Preparation and biological activity of the new cytokinin derivatives*. PhD Thesis, Palacký University Olomouc, Olomouc, Czech republic.

Budhiraja, R. D., Krishan, P., & Sudhir, S. 2000. Biological Activity of Withanolides. *Journal of Scientific & Industri al Research.* 59.

Busi, M. V., Bustamante, C., D'Angelo, C., Hidalgo-Cuevas, M., Boggio, S. B., Valle, E. M., & Zabaleta, E. 2003. MADS-box genes expressed during tomato seed and fruit development. *Plant Molecular Biology*. 52(4): 801–815. https://doi.org/10.1023/A:1025001402838

Çakir, Ö., Pekmez, M., Çepni, E., Candar, B., & Fidan, K. 2014. Evaluation of biological activities of *Physalis peruviana* ethanol extracts and expression of Bcl-2 genes in HeLa cells. *Food Science and Technology*. 34(2): 422–430. https://doi.org/10.1590/fst.2014.0060

Caputi, L., & Aprea, E. 2012. Use of Terpenoids as Natural Flavouring Compounds in Food Industry. *Recent Patents on Food, Nutrition & Agriculturee*. 3(1): 9–16. https://doi.org/10.2174/2212798411103010009

Cara, B., & Giovannoni, J. J. 2008. Molecular biology of ethylene during tomato fruit development and maturation. *Plant Science*. 175(1): 106–113. https://doi.org/10.1016/j.plantsci.2008.03.021

Carrizo García, C. 2002. Anther wall formation in Solanaceae species. *Annals of Botany*. 90(6): 701–706. https://doi.org/10.1093/aob/mcf248

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Carvalho, N., da Mata, L. R., Ribeiro, P. G., Moreira, A. L. D. C., Pinedo, A. S., Ribeiro, C. S. d. C., Souza, N. O. S., & Buso, G. S. C. 2021. Morphological and anatomical characterization of peduncle, flower and fruit related to easy fruit abscission of *Capsicum chinense* (Solanaceae) genotypes. *Genetics and Molecular Research*. 20(4). https://doi.org/10.4238/GMR18887

Chai, W. M., Liu, X., Hu, Y. H., Feng, H. L., Jia, Y. L., Guo, Y. J., Zhou, H. T., & Chen, Q. X. 2013. Antityrosinase and antimicrobial activities of furfuryl alcohol, furfural and furoic acid. *International Journal of Biological Macromolecules*. 57: 151–155. https://doi.org/10.1016/j.ijbiomac.2013.02.019

Chauhan, A., Tanwar, B., & Intelli. 2015. Influence of processing on physicochemical, nutritional and phytochemical composition of *Ficus carica* fruit. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 6(6): 1474–1489. https://doi.org/10.5958/j.0976-0563.33.1.008

Cheynier, V., Comte, G., Davies, K. M., Lattanzio, V., & Martens, S. 2013. Plant phenolics: Recent advances on their biosynthesis, genetics, andecophysiology. *Plant Physiology and Biochemistry*. 72: 1–20. https://doi.org/10.1016/j.plaphy.2013.05.009

Cong, B., Barrero, L. S., & Tanksley, S. D. 2008. Regulatory change in YABBY-like transcription factor led to evolution of extreme fruit size during tomato domestication. *Nature Genetics*. 40(6): 800–804. https://doi.org/10.1038/ng.144

Cong, B., Liu, J., & Tanksley, S. D. 2002. Natural alleles at a tomato fruit size quantitative trait locus differ by heterochronic regulatory mutations. *Proceedings of the National Academy of Sciences of the United States of America*. 99(21): 13606–13611. https://doi.org/10.1073/pnas.172520999

Cong, B., & Tanksley, S. D. 2006. FW2.2 and cell cycle control in developing tomato fruit: A possible example of gene co-option in the evolution of a novel organ. *Plant Molecular Biology*. 62(6): 867–880. https://doi.org/10.1007/s11103-006-9062-6

Costa, V.B., Pimentel R.M., Chagas M.G., Alves G.D., Castro C.C. 2017. Petal micromorphology and its relationship to pollination. *Plant Biol (Stuttg)*. 19(2):115-122. doi: 10.1111/plb.12523. Epub 2016 Nov 27. PMID: 27796070.

Cucinotta, M., Colombo, L., & Roig-Villanova, I. 2014. Ovule development, a new model for lateral organ formation. *Frontiers in Plant Science*. 5: 1–12. https://doi.org/10.3389/fpls.2014.00117

Dai, J., & Mumper, R. J. 2010. Plant phenolics: Extraction, analysis, and their antioxidant and anticancer properties. *Molecules*. 15(10): 7313–7352. https://doi.org/10.3390/molecules15107313

de Oliveira, A. M., Malunga, L. N., Perussello, C. A., Beta, T., & Ribani, R. H. 2020. Phenolic acids from fruits of *Physalis angulata* L. in two stages of maturation. *South African Journal of Botany*. 131: 448–453. https://doi.org/10.1016/j.sajb.2020.02.029

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

de Sales, P. M., de Souza, P. M., Simeoni, L. A., Magalhães, P. de O., & Silveira, D. 2012. α-amylase inhibitors: A review of raw material and isolated compounds from plant source. In *Journal of Pharmacy and Pharmaceutical Sciences*. 15(1): 141–183. https://doi.org/10.18433/j35s3k

Deng, Y., Jia, X., Liang, L., Gu, C., & Sun, X. 2016. Morphological anatomy, sporogenesis and gametogenesis in flowering process of jasmine (*Jasminum sambac* Aiton). *Scientia Horticulturae*. 198: 257–266. https://doi.org/10.1016/j.scienta.2015.11.036

Desjardins, P., & Conklin, D. 2010. NanoDrop microvolume quantitation of nucleic acids. *Journal of Visualized Experiments*. 45: 1–4. https://doi.org/10.3791/2565

Dhar N., Razdan S., Rana S., Bhat W.W., Vishwakarma R., and Lattoo S.K. 2015. A Decade of Molecular Understanding of Withanolide Biosynthesis and In vitro Studies in *Withania somnifera* (L.) Dunal: Prospects and Perspectives for Pathway Engineering. *Front. Plant Sci*. 6:1031. doi: 10.3389/fpls.2015.01031

Dias, G. B., Gomes, V. M., Moraes, T. M. S., Zottich, U. P., Rabelo, G. R., Carvalho, A. O., Moulin, M., Gonçalves, L. S. A., Rodrigues, R., & Da Cunha, M. 2012. Characterization of *Capsicum* species using anatomical and molecular data. *Genetics and Molecular Research*. 12(4): 6488–6501. https://doi.org/10.4238/2013.February.28.29

Diniz, F. O., & Novembre, A. D. da L. C. 2019. Maturation of *Physalis peruviana* L. seeds according to flowering and age of the fruit. *Revista Ciencia Agronomica*. 50(3): 447–457. https://doi.org/10.5935/1806-6690.20190053

Dyki, B., Jankiewicz, L. S., & Staniaszek, M. 1997. Anatomy and Surface Micromorphology of Tomatillo Fruit (*Physalis Ixocarpa* Brot.). *Acta Societatis Botanicorum Poloniae*. 66(1): 21–27. https://doi.org/10.5586/asbp.1997.003

Dyki, B., Jankiewicz, L. S., & Staniaszek, M. 1998. Anatomical structure and surface micromorphology of tomatillo leaf and flower (*Physalis ixocarpa* brot., Solanaceae). In *Acta Societatis Botanicorum Poloniae*. 67(2): 181–191. https://doi.org/10.5586/asbp.1998.021

El-Akad, R. H., Ibrahim, F. M., Ashour, W. E. S., Zeid, A. H. A., & Mohammed, R. S. 2022. *Physalis peruviana* L. fruit metabolome profiling via HR-UPLC/MS and its in vitro antiarthritic activity. *South African Journal of Botany*. 151: 649–654. https://doi.org/10.1016/j.sajb.2022.10.049

El-Morsy, M. H., & Osman, H. E. 2024. Morphological characteristics of *Physalis peruviana* L. *Handbook of Goldenberry (Physalis Peruviana): Cultivation, Processing, Chemistry, and Functionality*. pp 87–94. https://doi.org/10.1016/B978-0-443-15433-1.00008-X

Endress, P. K. 2019. The morphological relationship between carpels and ovules in angiosperms: pitfalls of morphological interpretation. *Botanical Journal of the Linnean Society*. 189(3): 201–227. https://doi.org/10.1093/botlinnean/boy083

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Erickson, A. N., & Markhart, A. H. 2002. Flower developmental stage and organ sensitivity of bell pepper (*Capsicum annuum* L.) to elevated temperature. *Plant, Cell and Environment.* 25(1): 123–130. https://doi.org/10.1046/j.0016-8025.2001.00807.x

Ferreira, L. dos S. L., do Vale, A., de Souza, A., Leite, K., Sacramento, C., Moreno, M. V., Araújo, T., Soares, M. P., & Grassi, M. R. 2019. Anatomical and phytochemical characterization of *Physalis angulata* L.: A plant with therapeutic potential. *Pharmacognosy Research*. 11(2): 171. https://doi.org/10.4103/pr.pr_97_18

Figueiredo, M. C. C., Passos, A. R., Hughes, F. M., Santos, K. S. dos, Silva, A. L. da, & Soares, T. L. 2020. Reproductive biology of *Physalis angulata* L. (Solanaceae). *Scientia Horticulturae*. 267. 109307. https://doi.org/10.1016/j.scienta.2020.109307

Franceschi, V. R., Krokene, P., Christiansen, E., & Krekling, T. 2005. Anatomical and chemical defenses of conifer bark against bark beetles and other pests. *New Phytologist*. 167(2): 353–376. https://doi.org/10.1111/j.1469-8137.2005.01436.x

Frary, A., Nesbitt, T. C., Frary, A., Grandillo, S., Van Der Knaap, E., Cong, B., Liu, J., Meller, J., Elber, R., Alpert, K. B., & Tanksley, S. D. 2000. fw2.2: A quantitative trait locus key to the evolution of tomato fruit size. *Science*. 289(5476): 85–88. https://doi.org/10.1126/science.289.5476.85

Freeman. 2008. An Overview of Plant Defenses against Pathogens and Herbivores. *The Plant Health Instructor*. https://doi.org/10.1094/phi-i-2008-0226-01

Furness, C. A., Rudall, P. J., & Sampson, F. B. 2002. Evolution of microsporogenesis in angiosperms. *International Journal of Plant Sciences*. 163(2): 235–260. https://doi.org/10.1086/338322

Galastri, N. A., Maria, D., & Oliveira, T. 2016. Megasporogenesis and megagametogenesis in species of Annonaceae , the largest family of early-diverging angiosperms. *New Zealand Journal of Botany*. 54(1): 63-73, DOI: 10.1080/0028825X.2015.1109526

Galbiati, F., Sinha Roy, D., Simonini, S., Cucinotta, M., Ceccato, L., Cuesta, C., Simaskova, M., Benkova, E., Kamiuchi, Y., Aida, M., Weijers, D., Simon, R., Masiero, S., & Colombo, L. 2013. An integrative model of the control of ovule primordia formation. *Plant Journal*. 76(3): 446–455. https://doi.org/10.1111/tpj.12309

Gao, H., Li, J., Wang, L., Zhang, J., & He, C. 2020. Transcriptomic variation of the flower–fruit transition in *Physalis* and *Solanum*. *Planta*. 252(2): https://doi.org/10.1007/s00425-020-03434-x

García-Hurtado, N. 2012. The role of hormones during tomato fruit set and development. *Plant Science*. 195: 69–75. https://doi.org/10.1016/j.plantsci.2012.06.008

Gasser, C. S., & Skinner, D. J. 2019. Development and evolution of the unique ovules of flowering plants. In *Current Topics in Developmental Biology*. 1(131). Elsevier Inc.

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

https://doi.org/10.1016/bs.ctdb.2018.10.007

Ghimire, B., & Heo, K. 2012. Embryology of *Withania somnifera* (L.) Dunal (Solanaceae). *Acta Biologica Cracoviensia Series Botanica*. 54(2): 69–78. https://doi.org/10.2478/v10182-012-0027-6

Gilead, S., & Shoham, Y. 1995. Purification and characterization of α-L-arabinofuranosidase from *Bacillus stearothermophilus* T-6. *Applied and Environmental Microbiology*. 61(1): 170–174. https://doi.org/10.1128/aem.61.1.170-174.1995

Gillaspy, G., Ben-David, H., & Gruissem, W. 1993. Fruits: A developmental perspective. *Plant Cell*. *5*(10): 1439–1451. https://doi.org/10.2307/3869794

Giovannoni, J. .2004. Genetic regulation of fruit development and ripening. *The Plant Cell*. 16: 170–180. https://doi.org/10.1105/tpc.017731

Goławska, S., Łukasik, I., & Czerniewicz, P. 2024. Genistein and Naringenin as Defense Molecules. *Molecules*. 29(23): https://doi.org/10.3390/molecules29235505

Goldberg, R. B., Beals, T. P., & Sanders, P. M. 1993. Anther development: Basic principles and practical applications. *Plant Cell*. 5(10): 1217–1229. https://doi.org/10.2307/3869775

Gómez, J. F., Talle, B., & Wilson, Z. A. 2015. Anther and pollen development: A conserved developmental pathway. *Journal of Integrative Plant Biology*. 57(11): 876–891. https://doi.org/10.1111/jipb.12425

Gonzalo, M. J., & Van Der Knaap, E. 2008. A comparative analysis into the genetic bases of morphology in tomato varieties exhibiting elongated fruit shape. *Theoretical and Applied Genetics*. 116(5): 647–656. https://doi.org/10.1007/s00122-007-0698-7

Göztok, F., & Zengin, F. 2015. The antimicrobial activity of *Physalis peruviana* L. *Bitlis Eren University Journal of Science and Technology*. 3(1): 15–15. https://doi.org/10.17678/beuscitech.47134

Gürel F., Öztürk Z.N., Uçarlı C., and Rosellini D. 2016. Barley Genes as Tools to Confer Abiotic Stress Tolerance in Crops. Front. *Plant Sci*. 7:1137. doi: 10.3389/fpls.2016.01137

Hamed, K. A. 2015. Venation Pattern in the Sepals of Certain Species of Solanaceae and its Contribution to the Taxonomy of the Family. *International Journal Of Agriculture & Biology*. 6(5): 850-855. https://doi.org/1560–8530/2004/06–5–850–855

Hao, D., Jin, L., Wen, X., Yu, F., Xie, Q., & Guo, H. 2021. The RING E3 ligase SDIR1 destabilizes EBF1/EBF2 and modulates the ethylene response to ambient temperature fluctuations in *Arabidopsis*. *Proceedings of the National Academy of Sciences of the United States of America*. 118(6): 1–10. https://doi.org/10.1073/pnas.2024592118

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Hedhly, A., Vogler, H., Schmid, M. W., Pazmino, D., Gagliardini, V., Santelia, D., & Grossniklaus, U. 2016. Starch turnover and metabolism during flower and early embryo development. *Plant Physiology*. 172(4): 2388–2402. https://doi.org/10.1104/pp.16.00916

Herrera, F., Mitchell, J. D., Pell, S. K., Collinson, M. E., Daly, D. C., & Manchester, S. R. 2018. Fruit Morphology and Anatomy of the *Spondioid Anacardiaceae*. *Botanical Review*. 84(4): 315–393. https://doi.org/10.1007/s12229-018-9201-1

Huang, X., C. Wang, Y. Zhao, C. Sun, D. Hu. 2021. Mechanisms and regulation of organic acid accumulation in plant vacuoles. *Horticulture Research*. 8:227 https://doi.org/10.1038/s41438-021-00702-z

Hu, F., Ye, Z., Dong, K., Zhang, W., Fang, D., & Cao, J. 2023. Divergent structures and functions of the Cupin proteins in plants. *International Journal of Biological Macromolecules*. 242(1), 124791. https://doi.org/10.1016/j.ijbiomac.2023.124791

Hu, Y., Zhi, L., Li, P., Hancock, J. T., & Hu, X. 2022. The Role of Salicylic Acid Signal in Plant Growth, Development and Abiotic Stress. *Phyton-International Journal of Experimental Botany*. 91(12): 2591–2605. https://doi.org/10.32604/PHYTON.2022.023733

Hussain, S. B., Shi, C. Y., Guo, L. X., Kamran, H. M., Sadka, A., & Liu, Y. Z. 2017. Recent Advances in the Regulation of Citric Acid Metabolism in *Citrus* Fruit. *Critical Reviews in Plant Sciences*. 36(4): 241–256. https://doi.org/10.1080/07352689.2017.1402850

Irish, V. F. 2009. Evolution of petal identity. *Journal of Experimental Botany*. 60(9): 2517–2527. https://doi.org/10.1093/jxb/erp159

Islam, M. S., Saito, J. A., Emdad, E. M., Ahmed, B., Islam, M. M., Halim, A., Hossen, Q. M. M., Hossain, M. Z., Ahmed, R., Hossain, M. S., Kabir, S. M. T., Khan, M. S. A., Khan, M. M., Hasan, R., Aktar, N., Honi, U., Islam, R., Rashid, M. M., Wan, X., Alam, M. 2017. Comparative genomics of two jute species and insight into fibre biogenesis. *Nature Plants*. 3(1): 1–7. https://doi.org/10.1038/nplants.2016.223

Iwashina, T., & Mizuno, T. 2020. Flavonoids and Xanthones From the Genus Iris : Phytochemistry , Relationships with Flower Colors and Taxonomy , and Activities and Function. *Natural Product Communications*. 15(10): 1–35 https://doi.org/10.1177/1934578X20937151

Jagatheeswari, D. 2014. *Morphological studies on flowering plants (Solanaceae)*. 15: 36–43. https://doi.org/10.18052/www.scipress.com/ILNS.15.36

Jamil, I., Qamarunnisa, S., Azhar, A., Shinwari, Z. K., Ali, S. I., & Qaiser, M. 2014. Subfamilial Relationships Within Solanaceae As Inferred From atpβ-rbcL Intergenic Spacer. In *Pak. J. Bot*. 46(2): 585-590.

Jin, W., Horner, H. T., Palmer, R. G., & Shoemaker, R. C. 1999. Analysis and mapping of

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

gene families encoding β-1,3-glucanases of soybean. *Genetics*. 153(1): 445–452. https://doi.org/10.1093/genetics/153.1.445

John, J., & Sarada, S. 2012. Role of phenolics in allelopathic interactions. *Allelopathy Journal*. 2: 215–230. https://www.researchgate.net/publication/280096292

Johri, B.M. 1984. Expreimental Embryology of Vacular Plants. Springer-Verlag. Newyork

Judkevich, M. D., Salas, R. M., & Gonzalez, A. M. 2022. Embryology of some flowers of the *Gardenieae complex* (Rubiaceae). *Protoplasma*. 259(5): 1233–1254. https://doi.org/10.1007/s00709-022-01734-5

Kelley, D. R., & Gasser, C. S. 2009. Ovule development: Genetic trends and evolutionary considerations. *Sexual Plant Reproduction*. 22(4): 229–234. https://doi.org/10.1007/s00497-009-0107-2

Khafagi, A., El- Ghamery, A., Ghaly, O., & Ragab, O. 2018. Fruit and Seed Morphology of Some Species of Solanaceae. *Taeckholmia*. 38(1): 123–140. https://doi.org/10.21608/taec.2018.13520

Kianersi, F., Abdollahi, M. R., Mirzaie-asl, A., Dastan, D., & Rasheed, F. 2020. Identification and tissue-specific expression of rutin biosynthetic pathway genes in *Capparis spinosa* elicited with salicylic acid and methyl jasmonate. *Scientific Reports.* 10(1): 1–15. https://doi.org/10.1038/s41598-020-65815-2

Kimura, Y., Tani, S., Hayashi, A., Ohtani, K., Fujioka, S., Kawano, T., & Shimada, A. 2007. Nematicidal activity of 5-hydroxymethyl-2-furoic acid against plant-parasitic nematodes. *Zeitschrift Fur Naturforschung - Section C Journal of Biosciences*. 62(3–4): 234–238. https://doi.org/10.1515/znc-2007-3-413

Kogan, M. 1987. Plant volatiles as insect attractants. *Critical Reviews in Plant Sciences*. 5(3): 251–301. https://doi.org/10.1080/07352688709382242

Kotia, A. 2017. *Biosystematics of Angiospermae, Plant Development and Reproduction*. Rajasthan State Cooperative Press.

Kreft, S., Štrukelj, B., Gaberščik, A., & Kreft, I. 2002. Rutin in buckwheat herbs grown at different UV-B radiation levels: Comparison of two UV spectrophotometric and an HPLC method. *Journal of Experimental Botany*. 53(375): 1801–1804. https://doi.org/10.1093/jxb/erf032

Kroymann, J. 2011. Natural diversity and adaptation in plant secondary metabolism. *Current Opinion in Plant Biology*. 14(3): 246–251. https://doi.org/10.1016/j.pbi.2011.03.021

Ku, H. M., Grandillo, S., & Tanksley, S. D. 2000. fs8.1, a major QTL, sets the pattern of tomato carpel shape well before anthesis. *Theoretical and Applied Genetics*. 101(5–6): 873–878. https://doi.org/10.1007/s001220051555

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Kusumaningtyas, R., Laily, N., & Limandha, P. 2015. Potential of Ciplukan (*Physalis angulata* L.) as Source of Functional Ingredient. *Procedia Chemistry*. 14: 367–372. https://doi.org/10.1016/j.proche.2015.03.050

Laranjeira, S., Amorim-Silva, V., Esteban, A., Arró, M., Ferrer, A., Tavares, R. M., Botella, M. A., Rosado, A., & Azevedo, H. 2015. Arabidopsis Squalene Epoxidase 3 (SQE3) Complements SQE1 and Is Important for Embryo Development and Bulk Squalene Epoxidase Activity. *Molecular Plant*. 8(7): 1090–1102. https://doi.org/10.1016/j.molp.2015.02.007

Lattanzio, V., Kroon, P. A., Quideau, S., & Treutter, D. 2008. Plant Phenolics - Secondary Metabolites with Diverse Functions. In *Recent Advances in Polyphenol Research*. (Vol. 1, Issue February). https://doi.org/10.1002/9781444302400.ch1

Lebeau-Roche, E., Daniele, G., Fildier, A., Turies, C., Dedourge-Geffard, O., Porcher, J. M., Geffard, A., & Vulliet, E. 2021. An optimized LC-HRMS untargeted metabolomics workflow for multi-matrices investigations in the three-spined stickleback. *PLoS ONE*. 16: 1–22. https://doi.org/10.1371/journal.pone.0260354

Li A, Sun X., and Liu L.2022. Action of Salicylic Acid on Plant Growth. *Front. Plant Sci*. 13:878076. doi: 10.3389/fpls.2022.878076

Li, Y., Qin, P., Sun, A., Xiao, W., Chen, F., He, Y., Yu, K., Li, Y., Zhang, M., & Guo, X. 2022. Genome-wide identification, new classification, expression analysis and screening of drought & heat resistance related candidates in the RING zinc finger gene family of bread wheat (*Triticum aestivum* L.). *BMC Genomics*. 23(1): 1–18. https://doi.org/10.1186/s12864-022-08905-x

Licodiedidoff, S., Koslowski, L. A. D., & Ribani, R. H. 2013. Flavonóis e atividade antioxidante do fruto *Physalis peruviana* L. em dois estádios de maturação. *Acta Scientiarum - Technology*. 35(2): 393–399. https://doi.org/10.4025/actascitechnol.v35i2.13265

Lin, D., Hu, L., You, H., Sarkar, D., Xing, B., & Shetty, K. 2010. Initial screening studies on potential of high phenolic-linked plant clonal systems for nitrate removal in cold latitudes. *Journal of Soils and Sediments*. 10(5): 923–932. https://doi.org/10.1007/s11368-010-0214-6

Linka, N., & Esser, C. 2012. Transport proteins regulate the flux of metabolites and cofactors across the membrane of plant peroxisomes. *Frontiers in plant science*. 3(1): 1–13. https://doi.org/10.3389/fpls.2012.00003

Liu, J., Shi, M., Wang, J., Zhang, B., Li, Y., Wang, J., El-Sappah, A. H., & Liang, Y. 2020. Comparative transcriptomic analysis of the development of sepal morphology in tomato (*Solanum lycopersicum* l.). *International Journal of Molecular Sciences*. 21(16): 1–23. https://doi.org/10.3390/ijms21165914

Liu, L., & Wang, T. 2021. Male gametophyte development in flowering plants: A story of quarantine and sacrifice. *Journal of Plant Physiology*. 258: 153365. https://doi.org/10.1016/j.jplph.2021.153365

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Liu, Y., Gu, L., & Liu, J. 2017. Sporogenesis , gametogenesis and pollen morphology of *Solanum japonense* and *S . septemlobum (* Solanaceae *)*. *Archives of Biological Sciences*. 70(2): 313-320.https://doi.org/10.2298/ABS170724048L

Loreto, F., Dicke, M., Schnitzler, J. P., & Turlings, T. C. J. 2014. Plant volatiles and the environment. *Plant, Cell and Environment*. 37(8): 1905–1908. https://doi.org/10.1111/pce.12369

Lozano, R., Giménez, E., Cara, B., Capel, J., & Angosto, T. 2009. Genetic analysis of reproductive development in tomato. In *International Journal of Developmental Biology*. 53(8–10): 1635–1648. https://doi.org/10.1387/ijdb.072440rl

Lu, J., Luo, M., Wang, L., Li, K., Yu, Y., Yang, W., Gong, P., Gao, H., Li, Q., Zhao, J., Wu, L., Zhang, M., Liu, X., Zhang, X., Zhang, X., Kang, J., Yu, T., Li, Z., Jiao, Y. He. 2021. The *Physalis floridana* genome provides insights into the biochemical and morphological evolution of *Physalis* fruits. *Horticulture Research*. 8(1). https://doi.org/10.1038/s41438-021-00705-w

Mamadalieva, N. Z., Šoral, M., Kysil, E., Stark, P., Frolov, A., & Wessjohann, L. A. 2024. Comparative metabolic profiling and quantitative analysis of metabolites in different tissues of *Ajuga turkestanica* by ESI-UHPLC-QqTOF-MS and NMR. *Scientific Reports*. 14(1): 1–13. https://doi.org/10.1038/s41598-024-71546-5

Manning, K., Tör, M., Poole, M., Hong, Y., Thompson, A. J., King, G. J., Giovannoni, J. J., & Seymour, G. B. 2006. A naturally occurring epigenetic mutation in a gene encoding an SBP-box transcription factor inhibits tomato fruit ripening. *Nature Genetics*. 38(8): 948–952. https://doi.org/10.1038/ng1841

Marchant, D. B., & Walbot, V. 2022. Anther development—The long road to making pollen. *Plant Cell*. 34(12): 4677–4695. https://doi.org/10.1093/plcell/koac287

Marsh, K. J., Wallis, I. R., Kulheim, C., Clark, R., Nicolle, D., Foley, W. J., & Salminen, J. P. 2020. New approaches to tannin analysis of leaves can be used to explain in vitro biological activities associated with herbivore defence. *New Phytologist*. 225(1): 488–498. https://doi.org/10.1111/nph.16117

Martins, N., Barros, L., & Ferreira, I. C. F. R. 2016. In vivo antioxidant activity of phenolic compounds: Facts and gaps. *Trends in Food Science and Technology*. *48*: 1–12. https://doi.org/10.1016/j.tifs.2015.11.008

Matsuura, H. N., & Fett-Neto, A. G. 2015. Plant Alkaloids: Main Features, Toxicity, and Mechanisms of Action. *Plant Toxins*. 1:1–15. https://doi.org/10.1007/978-94-007-6728-7_2-1

Maurer, T. R., Tonello, C., Machado, B., Trentin, T., Bertol, C., Lângaro, N., & Chiomento, J. L. 2023. Phytochemical potential of berries: An overview. *Latin American Developments in Energy Engineering*. 4(1): 11–28. https://doi.org/10.17981/ladee.04.01.2023.2

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Mayer, E. S., Ben-Michael, T., Kimhi, S., Forer, I., Rabinowitch, H. D., & Kamenetsky, R. 2015. Effects of different temperature regimes on flower development, microsporogenesis and fertility in bolting garlic (*Allium sativum*). *Functional Plant Biology*. 42(6): 514–526. https://doi.org/10.1071/FP14262

Mejat, D. 2023. An Overview on Fatty Acid Synthesis and Ecological Consequences in Plants. *Journal of Plant Biochemistry & Physiology*. 1–2. https://doi.org/10.35248/2329-9029.23.11.282.Citation

Mera, I. F. G., Falconí, D. E. G., & Córdova, V. M. 2019. Secondary metabolites in plants: Main classes, phytochemical analysis and pharmacological activities. In *Revista Bionatura*. 4(4). https://doi.org/10.21931/RB/2019.04.04.11

Mishra, S. R. 2009. *Understanding Plant Anatomy*. Discovery Publishing House Pvt. Ltd.

Monniaux, M., & Vandenbussche, M. 2023. Flower Development in the Solanaceae. *Methods in Molecular Biology*. 2686: 39–58. https://doi.org/10.1007/978-1-0716-3299-4_2

Muniz, J., Aike, I., Kretzschmar, A., Leo, I., Tânia, R. I., Pelizza, R., De, A., & Rufato, R. 2014. *General aspects of physalis cultivation Aspectos gerais da cultura da physalis*. 6: 964–970.

Muravnik, L. E., Kostina, O. V., & Zaporozhets, N. L. 2022. Structure and functions of the glandular trichomes in three *Arnica species* (Asteraceae), depending on their location on leaves and flowers. *Flora: Morphology, Distribution, Functional Ecology of Plants.* 152047. https://doi.org/10.1016/j.flora.2022.152047

Mutz, K. O., Heilkenbrinker, A., Lönne, M., Walter, J. G., & Stahl, F. 2013. Transcriptome analysis using next-generation sequencing. *Current Opinion in Biotechnology*. 24(1): 22–30. https://doi.org/10.1016/j.copbio.2012.09.004

Nadhifah, A., Suratman, & Pitoyo, A. 2016. Kekerabatan fenetik ciplukan (*Physalis angulata* L.) di wilayah eks-Karesidenan Surakarta berdasarkan karakter morfologis, palinologis dan pola pita isozim [Phenetic relationship among ciplukan (*Physalis angulata* L.) in Surakarta based on variation. *Jurnal Tumbuhan Obat Indonesia*. 9(1): 1–10.

Ng, Y. P., Or, T. C. T., & Ip, N. Y. 2015. Plant alkaloids as drug leads for Alzheimer's disease. *Neurochemistry International*. 89: 260–270. https://doi.org/10.1016/j.neuint.2015.07.018

Nurul Latifah, Ari Ariefah Hidayati, S. R. Y. dan E. S. 2008. Ciplukan (*Physalis angulata* L.). In *Plant Resources of Tropical Africa 11(1): Medicinal plants*. 1: 437–440. https://research.wur.nl/en/publications/plant-resources-of-tropical-africa-111 medicinal-plants-1

Oberti, H., Gutierrez-Gonzalez, J., & Pritsch, C. 2024. A first de novo transcriptome

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

assembly of feijoa (*Acca sellowiana* [Berg] Burret) reveals key genes involved in flavonoid biosynthesis. *Plant Genome*. 17(3): 1–17. https://doi.org/10.1002/tpg2.20501

Ogunrinde, A., Munro, K., Davidson, A., Ubaid, M., & Snedden, W. A. 2017. *Arabidopsis* calmodulin-like proteins, CML15 and CML16 possess biochemical properties distinct from calmodulin and show non-overlapping tissue expression patterns. *Frontiers in Plant Science*. 8: 1–17. https://doi.org/10.3389/fpls.2017.02175

Okmanov, R. Y., Makhmudova, M. M., Bobaev, I. D., & Tashkhodjaev, B. 2021. Withanolides from *Physalis angulata* L. *Acta Crystallographica Section E: Crystallographic Communications*. 77: 804–808. https://doi.org/10.1107/S205698902100709X

Oztruk, A., Özdemir, Y., Albayrak, B., Simsek, M., & Yıldırım, K. C. 2017. Some Nutrient Characteristics of Goldenberry (*Physalis Peruviana* L.) Cultivar Candidate From Turkey. *Scientific Papers - Series B, Horticulture*. 61: 293–297.

Pattison, R. J. 2014. Hormonal regulation of tomato fruit development: A molecular perspective. *Journal of Plant Growth Regulation*. 33(2): 307–322. https://doi.org/10.1007/s00344-013-9387-8

Paul, I., Poddar Sarkar, M., & Bhadoria, P. B. S. 2022. Floral secondary metabolites in context of biotic and abiotic stress factors. *Chemoecology*. 32(2): 49–68. https://doi.org/10.1007/s00049-021-00366-0

Pérez-Castorena, A. L., Hernández, I. Z., Martínez, M., & Maldonado, E. 2013. Chemical study of calyxes and roots of Physalis solanaceus. *Records of Natural Products*. 7(3): 230–233.

Petkova, N. T., Popova, V. T., Ivanova, T. A., Mazova, N. N., Panayotov, N. D., & Stoyanova, A. 2021. Nutritional composition of different cape gooseberry genotypes (*Physalis peruviana*) – a comparative study. *Food Research*. 5(4): 191–202. https://doi.org/10.26656/fr.2017.5(4).123

Pitt, J. J. 2009. Principles and Applications of Liquid ChromatographyMass Spectrometry in Clinical Biochemistry. *Clin Biochem Rev*. 30: 19–34.

Primer, A. 1998. *Basics of LC/MS*.

Qiao, Z., Deng, F., Zeng, H., Li, X., Lu, L., Lei, Y., Li, L., Chen, Y., & Chen, J. 2024. MADS-Box Family Genes in *Lagerstroemia indica* and Their Involvement in Flower Development. *Plants*. 13(5). https://doi.org/10.3390/plants13050709

Qin, G., Xu, C., Ming, R., Tang, H., Guyot, R., Kramer, E. M., Hu, Y., Yi, X., Qi, Y., Xu, X., Gao, Z., Pan, H., Jian, J., Tian, Y., Yue, Z., & Xu, Y. 2017. The pomegranate (*Punica granatum* L.) genome and the genomics of punicalagin biosynthesis. *Plant Journal*. 91(6): 1108–1128. https://doi.org/10.1111/tpj.13625

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Quan, W., Chan, Z., Wei, P., Mao, Y., Bartels, D., & Liu, X. 2023. PHD finger proteins function in plant development and abiotic stress responses: an overview. *Frontiers in Plant Science*. 14: 1–13. https://doi.org/10.3389/fpls.2023.1297607

Quinet, M., Angosto, T., Yuste-Lisbona, F. J., Blanchard-Gros, R., Bigot, S., Martinez, J. P., & Lutts, S. 2019. Tomato Fruit Development and Metabolism. *Frontiers in Plant Science*. 10: 1–23. https://doi.org/10.3389/fpls.2019.01554

Ramadan, M. F., & Moersel, J. T. 2007. Impact of enzymatic treatment on chemical composition, physicochemical properties and radical scavenging activity of goldenberry (*Physalis peruviana* L.) juice. *Journal of the Science of Food and Agriculture*. 87(3): 452–460. https://doi.org/10.1002/jsfa.2728

Ramakrishna, A., & Ravishankar, G. A. 2011. Influence of abiotic stress signals on secondary metabolites in plants. *Plant Signaling and Behavior*. 6(11): 1720–1731. https://doi.org/10.4161/psb.6.11.17613

Ramezani, H., Chehregani Rad, A., & Karamian, R. 2018. Development of the male and female gametophyte in *Capsicum annuum* L. var. California Wonder. *Plant Biosystems*. 152(5): 1172–1181. https://doi.org/10.1080/11263504.2018.1435568

Ramos, C. A. da S., Soares, T. L., Barroso, N. S., & Pelacani, C. R. 2021. Influence of maturity stage on physical and chemical characteristics of fruit and physiological quality of seeds of *Physalis angulata* L. *Scientia Horticulturae*. 284. https://doi.org/10.1016/j.scienta.2021.110124

Rani, C. S., & Sudhakar, C. 2018. Effect of plant growth retardants on growth , yield and economics of kharif pigeonpea (*Cajanus cajan* L.). *International Journal of Chemical Studies*. 6(6): 1495–1498.

Rasbery, J. M., Shan, H., LeClair, R. J., Norman, M., Matsuda, S. P. T., & Bartel, B. 2007. *Arabidopsis thaliana* squalene epoxidase 1 is essential for root and seed development. *Journal of Biological Chemistry*. 282(23): 17002–17013. https://doi.org/10.1074/jbc.M611831200

Raskin, I., Ribnicky, D. M., Komarnytsky, S., Ilic, N., Poulev, A., Borisjuk, N., Brinker, A., Moreno, D. A., Ripoll, C., Yakoby, N., O'Neal, J. M., Cornwell, T., Pastor, I., & Fridlender, B. 2002. Plants and human health in the twenty-first century. *Trends in Biotechnology*. 20(12): 522–531. https://doi.org/10.1016/S0167-7799(02)02080-2

Rengifo, E., & Vargas-Arana, G. 2013. *Physalis angulata* L. (Bolsa Mullaca): A Review of its Traditional Uses, Chemistry and Pharmacology Bioprospection. *Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas*. 12 (5): 431 - 445 https://www.researchgate.net/publication/260284500

Robles, P., & Pelaz, S. 2005. Flower and fruit development in *Arabidopsis thaliana*. In *International Journal of Developmental Biology*. 49(–6): 633–643. https://doi.org/10.1387/ijdb.052020pr

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Rodrigues, F. A., Dória, J., Soares, R., Alves, R., Silva, L., Dos, E., Penoni, S., Pasqual, M., Pereira, F. J., & Mauro De Castro, E. 2014. Anatomy of vegetative organs and seed histochemistry of *Physalis peruviana* L. *Australian Journal of Crop Sciences*. 8(6): 895-900.

Rodriguez, I. 2000. Flower anatomy and morphology of *Exodeconus maritimus* (Solanaceae, Solaneae) and *Nicandra physalodes* (Solanaceae, Nicandreae). *Adansonia*. 22(2): 187–199.

Rodríguez, M., Arjona, ; Harvey, Fischer, ; Gerhard, Campos, H., & Chaparro De Valencia, M. 2010. Aspectos Anatómicos del Desarrollo del Fruto de Feijoa [*Acca sellowiana*(O.Berg) Burret]. *Rev.Fac.Nal.Agr.Medellín*. 63(1): 5267–5273.

Roncaglia, P., Martone, M. E., Hill, D. P., Berardini, T. Z., Foulger, R. E., Imam, F. T., Drabkin, H., Mungall, C. J., & Lomax, J. 2013. The Gene Ontology (GO) Cellular Component Ontology : integration with SAO (Subcellular Anatomy Ontology) and other recent developments. *Journal of Biomedical Semantics*. 4(1). https://doi.org/10.1186/2041-1480-4-20

Ronse, L., Wanntorp, L., Annals, S., October, N., Craene, L. R. De, & Wanntorp, L. 2022. Floral development and anatomy of Salvadoraceae. *Ann. Bot*. 104(5): 913–923. https://doi.org/10.1093/aob/mcpl70

Rukmi, K., & Waluyo, B. 2019. Keragaman Genetik Aksesi Ciplukan (Physalis sp.) Berdasarkan Karakter Morfologi dan Agronomi Variability Genetic Accession Of Ciplukan (*Physalis* sp .) Based On Agronomic and Morphological Characters. *Jurnal Produksi Tanaman*. 7(2): 209–217. http://protan.studentjournal.ub.ac.id/index.php/protan/article/view/1024/1041

Ruzin, S. 1999. *Plant Microtechnique and microscopy*. Oxford University Press.

Salim, S. A., Abood, K. H., & Razzooqee, M. A. 2019. Determination of secondary metabolites in callus and different tissues of *Physalis angulata* L. *Research on Crops*. 20(3): 642–647. https://doi.org/10.31830/2348-7542.2019.094

Sampson, F. B., Furness, C. A., & Rudall, P. J. 2002. *Evolution of Microsporogenesis in Angiosperms*. *Int. J. Plant Sci*. 163(2): 235–260. https://doi.org/10.1086/338322

Seymour, G. B., Manning, K., Eriksson, E. M., Popovich, A. H., & King, G. J. 2002. Genetic identification and genomic organization of factors affecting fruit texture. *Journal of Experimental Botany*. 53(377): 2065–2071. https://doi.org/10.1093/jxb/erf087

Shakhnoza S. Azimova., M. S. Y. 2013. Natural Compounds Alkaloids Plant Sources, Structure and Properties. Springer.

Sharmila, S., Kalaichelvi, K., Rajeswari, M., & Anjanadevi, N. 2014. Studies On The Folklore Medicinal Uses Of Some Indigenous Plants Among The Tribes Of Thiashola. *International Journal of Plant, Animal and Environmental Sciences.* 4(3):

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

14-22.

Shi, H., Jiang, J., Yu, W., Cheng, Y., Wu, S., Zong, H., Wang, X., Ding, A., Wang, W., & Sun, Y. 2024. Naringenin restricts the colonization and growth of *Ralstonia solanacearum* in tobacco mutant KCB-1. *Plant Physiology*. 195(3): 1818–1834. https://doi.org/10.1093/plphys/kiae185

Sholehah, D. N., Hariyanto, S., & Purnobasuki, H. 2021. Fruit development of groundcherry (*Physalis angulata* L.) in dryland. *Australian Journal of Crop Science*. 15(8): 1186–1191. https://doi.org/10.21475/ajcs.21.15.08.p3318

Singh, N., Singh, S., Maurya, P., Arya, M., Khan, F., Dwivedi, D. H., & Saraf, S. A. 2019. An updated review on *Physalis peruviana* fruit: Cultivational, nutraceutical and pharmaceutical aspects. *Indian Journal of Natural Products and Resources*. 10(2): 97-110.

Sokoloff, D. D., Jura-Morawiec, J., Zoric, L., & Fay, M. F. 2021. Plant anatomy: At the heart of modern botany. *Botanical Journal of the Linnean Society*. 195(3): 249–253. https://doi.org/10.1093/botlinnean/boaa110

Soriano, I. R., Riley, I. T., Potter, M. J., & Bowers, W. S. 2004. Phytoecdysteroids: A novel defense against plant-parasitic nematodes. *Journal of Chemical Ecology*. 30(10): 1885–1899. https://doi.org/10.1023/B:JOEC.0000045584.56515.11

Soviguidi, D. R. J., Pan, R., Liu, Y., Rao, L., Zhang, W., & Yang, X. 2022. Chlorogenic acid metabolism: The evolution and roles in plant response to abiotic stress. *Phyton-International Journal of Experimental Botany*. 91(2): 239–255. https://doi.org/10.32604/phyton.2022.018284

Srivastava, L. M. 2002. *Plant Growth and Development : Hormones and Environment*. Academic Press Inc.

Sullivan, J. R. 2020. Systematics of the *Physalis viscosa (Solanaceae). American Society of Plant Taxonomists*. 10(4): 426–444. *Stable URL : https://www.jstor.org/stable/2419136*

Sumczynski, D., Kotásková, E., Družbíková, H., & Mlček, J. 2016. Determination of contents and antioxidant activity of free and bound phenolics compounds and in vitro digestibility of commercial black and red rice (*Oryza sativa* L.) varieties. *Food Chemistry*. 211: 339–346. https://doi.org/10.1016/j.foodchem.2016.05.081

Surco-Laos, F., Valle, C. M., Loyola, E., Dueñas, M., & Santos, C. 2016. Antioxidants activity of flavonoid metabolites caused by the human gut microflora. *Revista de La Sociedad Química Del Perú*, *81*(1).

Suryani, T., Susanti, S., & Utaminingsih. 2020. Microsporogenensis of Ciplukan *(Physalis angulata L .)*. *Proceeding ICBS.* 2260(1):030017. DOI:10.1063/5.0016268

Susila, H., Nasim, Z., Gawarecka, K., Jung, J. Y., Jin, S., Youn, G., & Ahn, J. H. 2021.

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

PHOSPHORYLETHANOLAMINE CYTIDYLYLTRANSFERASE 1 modulates flowering in a florigen-independent manner by regulating SVP. *Development (Cambridge)*. 148(1): 1–8. https://doi.org/10.1242/dev.193870

Tan, J., Tu, L., Deng, F., Hu, H., Nie, Y., & Zhang, X. 2013. A genetic and metabolic analysis revealed that cotton fiber cell development was retarded by flavonoid naringenin. *Plant Physiology*. 162(1): 86–95. https://doi.org/10.1104/pp.112.212142

Tanksley, S. D. 2004. The genetic, developmental, and molecular bases of fruit size and shape variation in tomato. *Plant Cell*. 16: 18119. https://doi.org/10.1105/tpc.018119

Teoh, E. S. 2016. Medicinal orchids of Asia. Springer International Publishing Switzerland. pp 1–752. https://doi.org/10.1007/978-3-319-24274-3

Suzuki, M., Yukiko K., Noriko N., Hikaru S., Kiyoshi O., Hisashi K., Kazuo M., Shusei S., Tomohiko K., Satoshi T., Shigeo Y., and Toshiya M. 2004. Loss of function of 3-hydroxy-3-methylglutaryl coenzyme A reductase 1 HMG1. *The Plant Journal*. 37: 750-761. doi: 10.1111/j.1365-313X.2003.02003.x

Salazar-Sarasua B., López-Martín M.J., Roque E., Hamza R., Cañas L.A., Beltrán J.P., Gómez-Mena C. 2022. The tapetal tissue is essential for the maintenance of redox homeostasis during microgametogenesis in tomato. *Plant J.* 112(5):1281-1297. doi: 10.1111/tpj.16014.

Thermo Scientific. 2000. NanoDrop 2000 / 2000c Spectrophotometer. *Thermo Scientific Inc*.

Thomson, B., & Wellmer, F. 2019. Molecular regulation of flower development. In *Current Topics in Developmental Biology* (1st ed., Vol. 131). Elsevier Inc. https://doi.org/10.1016/bs.ctdb.2018.11.007

Tiago, O., Maicon, N., Ivan, R. C., Diego, N. F., Vinícius, J. S., Mauricio, F., Alan, J. de P., & Velci, Q. de S. 2017. Plant secondary metabolites and its dynamical systems of induction in response to environmental factors: A review. *African Journal of Agricultural Research*. 12(2): 71–84. https://doi.org/10.5897/ajar2016.11677

Tomczak, A., Mortens, J. M., Winnenburg, R., Liu, C., Alessi, T., Swamy, V., Vallania, F., Lofgren, S., Haynes, W., Shah, N. H., Musen, M. A., & Khatri, P. 2018. Interpretation of biological experiments changes with evolution of the Gene Ontology and its annotations. *Nature scientific reports*. 8:5115. https://doi.org/10.1038/s41598-018-23395-2

Tyagi, A., Singh, B., Billekallu Thammegowda, N. K., & Singh, N. K. 2019. Shotgun metagenomics offers novel insights into taxonomic compositions, metabolic pathways and antibiotic resistance genes in fish gut microbiome. *Archives of Microbiology*. 201(3): 295–303. https://doi.org/10.1007/s00203-018-1615-y

Valenta, K., Burke, R. J., Styler, S. A., Jackson, D. A., Melin, A. D., & Lehman, S. M. 2013. Colour and odour drive fruit selection and seed dispersal by mouse lemurs.

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Scientific Reports. 3: 2424. https://doi.org/10.1038/srep02424

van Mourik, S., van Dijk, A. D. J., de Gee, M., Immink, R. G. H., Kaufmann, K., Angenent, G. C., van Ham, R. C. H. J., & Molenaar, J. 2010. Continuous-time modeling of cell fate determination in *Arabidopsis* flowers. *BMC Systems Biology*. 4(101): 1-13. https://doi.org/10.1186/1752-0509-4-101

Vanhercke, T., Wood, C. C., Stymne, S., Singh, S. P., & Green, A. G. 2013. Metabolic engineering of plant oils and waxes for use as industrial feedstocks. *Plant Biotechnology Journal*. 11(2): 197–210. https://doi.org/10.1111/pbi.12023

Vattem, D. A., Randhir, R., & Shetty, K. 2005. Cranberry phenolics-mediated antioxidant enzyme response in oxidatively stressed porcine muscle. *Process Biochemistry*. 40(6): 2225–2238. https://doi.org/10.1016/j.procbio.2004.09.001

Veitch, G. E., Boyer, A., & Ley, S. V. 2008. The azadirachtin story. *Angewandte Chemie - International Edition*. 47(49): 9402–9429. https://doi.org/10.1002/anie.200802675

Velderrain-Rodríguez, G. R., Palafox-Carlos, H., Wall-Medrano, A., Ayala-Zavala, J. F., Chen, C. Y. O., Robles-Sánchez, M., Astiazaran-García, H., Alvarez-Parrilla, E., & González-Aguilar, G. A. 2014. Phenolic compounds: Their journey after intake. *Food and Function.* 5(2): 189–197. https://doi.org/10.1039/c3fo60361j

Verdaguer, D., Jansen, M. A. K., Llorens, L., Morales, L. O., & Neugart, S. 2017. UV-A radiation effects on higher plants: Exploring the known unknown. *Plant Science*. *255*: 72–81. https://doi.org/10.1016/j.plantsci.2016.11.014

Vrebalov, J., Ruezinsky, D., Padmanabhan, V., White, R., Medrano, D., Drake, R., Schuch, W., & Giovannoni, J. 2002. A MADS-box gene necessary for fruit ripening at the tomato ripening-inhibitor (rin) locus. *Science*. 296(5566): 343–346. https://doi.org/10.1126/science.1068181

Wang, H., Caruso, L. V., Downie, A. B., & Perry, S. E. 2004. The embryo Mads domain protein Agamous-like 15 directly regulates expression of a gene encoding an enzyme involved in gibberellin metabolism. *Plant Cell*. 16(5): 1206–1219. https://doi.org/10.1105/tpc.021261

Wang, L., Cui, D., Zhao, X., & He, M. 2017. The Important Role of the Citric Acid Cycle in Plants. *Genomics and Applied Biology*. 8(4): 25-29. https://doi.org/10.5376/gab.2017.08.0004

Wang, L., He, L., Li, J., Zhao, J., Li, Z., & He, C. 2014. Regulatory change at Physalis Organ Size 1 correlates to natural variation in tomatillo reproductive organ size. *Nature Communications*. 5:4271. https://doi.org/10.1038/ncomms5271

Wang, L., Li, J., Zhao, J., & He, C. 2015. Evolutionary developmental genetics of fruit morphological variation within the solanaceae. *Frontiers in Plant Science*. 6: 1–10. https://doi.org/10.3389/fpls.2015.00248

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Wang, Z., Gerstein, M., & Snyder, M. 2009. RNA-Seq: a revolutionary tool for transcriptomics. *Nat Rev Genet*. 10: 57–63. https://doi.org/10.1038/nrg2484

Wani, T. A., Pandith, S. A., Gupta, A. P., Chandra, S., Sharma, N., & Lattoo, S. K. 2017. Molecular and functional characterization of two isoforms of chalcone synthase and their expression analysis in relation to flavonoid constituents in *Grewia asiatica* L. *PLoS ONE*. 12(6): 1–24. https://doi.org/10.1371/journal.pone.0179155

Whitson, M., & Manos, P. S. 2005. Untangling *Physalis* (Solanaceae) from the Physaloids: A Two-Gene Phylogeny of the Physalinae. *Systematic Botany*. 30(1): 216-230. https://www.jstor.org/stable/25064051

Worley, B., & Powers, R. 2013. Multivariate Analysis in Metabolomics. *Current Metabolomics*. 1(1): 92–107. https://doi.org/10.2174/2213235x11301010092

Wu, J., Zhao, J., Zhang, T., Gu, Y., Khan, I. A., Zou, Z., & Xu, Q. 2021. Naturally occurring physalins from the genus *Physalis*: A review. *Phytochemistry*. 191. https://doi.org/10.1016/j.phytochem.2021.112925

Xiao, H., Jiang, N., Schaffner, E., Stockinger, E. J., & Van Der Knaap, E. 2008. A retrotransposon-mediated gene duplication underlies morphological variation of tomato fruit. *Science*. 319(5869): 1527–1530. https://doi.org/10.1126/science.1153040

Yang, W., Xu, X., Li, Y., Wang, Y., Li, M., Wang, Y., Ding, X., & Chu, Z. 2016. Rutin-mediated priming of plant resistance to three bacterial pathogens initiating the early SA signal pathway. *PLoS ONE*. 11(1): 1–15. https://doi.org/10.1371/journal.pone.0146910

Yelliantty, Y., Kartasasmita, R. E., Surantaatmadja, S. I., & Rukayadi, Y. 2022. Identification of chemical constituents from fruit of *Antidesma bunius* by GC-MS and HPLC-DAD-ESI-MS. *Food Science and Technology*. 42:61320. https://doi.org/10.1590/fst.61320

Zhang, Y.-J., Deng, G.-F., Xu, X.-R., Wu, S., Li, S., & Li, H.-B. 2013. Gooseberry (*Physalis peruviana*). *International Journal of Food Nutrition and Safety*. 3(1): 15–24.http://modernscientificpress.com/Journals/ViewArticle.aspx?6ZIT7oAL6Lqarm6Ljqm1AEElk+hj9A+fv9GWpU/xhwwRe+2q2RWNomBD9aIj2kYX

Zhang, Y. Y., Li, Y., Gao, T., Zhu, H., Wang, D. J., Zhang, H. W., Ning, Y. S., Liu, L. J., Wu, Y. R., Chu, C. C., Guo, H. S., & Xie, Q. 2008. Arabidopsis SDIR1 enhances drought tolerance in crop plants. *Bioscience, Biotechnology and Biochemistry*. 72(8): 2251–2254. https://doi.org/10.1271/bbb.80286

Zhang, Y., Yang, C., Li, Y., Zheng, N., Chen, H., Zhao, Q., Gao, T., Guo, H., & Xie, Q. 2007. SDIR1 is a RING finger E3 ligase that positively regulates stress-responsive abscisic acid signaling in Arabidopsis. *Plant Cell*. 19(6): 1912–1929. https://doi.org/10.1105/tpc.106.048488

UNIVERSITAS
GADJAH MADA
Kajian Anatomis, Fitokimia, dan Molekuler Bunga dan Buah Ciplukan (Physalis peruviana L.) dalam Berbagai Tahap Perkembangan
Utaminingsih, Dr. Maryani, M.Sc.; Prof. Dr. L.Hartanto Nugroho, M.Agr.; Dr. Tri Rini Nuringtyas, M.Sc.
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Zillich, O. V., Schweiggert-Weisz, U., Eisner, P., & Kerscher, M. 2015. Polyphenols as active ingredients for cosmetic products. *International Journal of Cosmetic Science*. 37(5): 455–464. https://doi.org/10.1111/ics.12218