# Zhi-Yan (Rock) Du

**College of Tropical Agriculture and Human Resources *Department of Molecular Biosciences & BioEngineering*** FTE Distribution: 40% I; 60% R; 0% E

# Education

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| **Degree** | **University** | **Major** |
| Bachelors | Beijing Forestry University | Biological Sciences |
| Masters | Institute of Botany, Chinese  Academy of Sciences | Evolutionary Developmental  Biology |
| PhD | The University of Hong Kong | Biochemistry & Molecular  Biology |

**Professional Appointments**

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| **Title** | **Employer** | **Dates Employed** |
| Assistant Professor  (tenure-track) | Department of Molecular  Biosciences & BioEngineering, UHM | 2020.8 - present |
| Assistant Professor (fixed-term) | Department of Biochemistry &  Molecular Biology, Michigan State University | 2018-2020 |
| Research Associate | US Department of Energy-MSU  Plant Research Laboratory, Michigan State University | 2013 - 2018 |
| Research Assistant | Plant Molecular Biology and  Biochemistry, School of Biological Sciences, The University of Hong Kong | 2011 - 2013 |

**Courses Taught**

Course ID and name (credits)

MBBE/BIOL 401 Molecular Biotechnology (3 cr, Spring)

MBBE/BIOL 401L Molecular Biotechnology Lab - Gene Editing by CRISPR (2 cr, Spring)

MBBE 691 Advanced Special Topics in MBBE (guest speaker, 1 cr, Fall)

# Publications (reverse chronological order)

Books

**Du, Z.**, Hoffmann-Benning, S., Zienkiewicz, A., Zienkiewicz, K., Wang, S., Yin, L. Lipid Metabolism

in Development and Environmental Stress Tolerance for Engineering Agronomic Traits. Frontiers

Media SA. 2021.

Book Chapters

1. Zhu, S., Bonito, G., Chen, Y., and **Du, Z.\*** 2020. Oleaginous Fungi in Biorefineries. In “Reference

Module in Life Sciences” (ISBN 9780128096338), DOI: 10.1016/B978-0-12-819990-9.00004-4.

1. **Du, Z.**, and Benning, C. 2016. Triacylglycerol accumulation in photosynthetic cells in plants and algae.

In “Lipids in plant and algae development” (ISBN 9783319259796), edited by Nakamura, Y. and Li-Beisson Y. Springer. 179-205.

Book Reviews

**Du, Z.** Handbook of Algal Science, Technology and Medicine. Edited by Ozcan Konur. Academic

Press. Amsterdam (The Netherlands) and New York: Elsevier. ISBN: 978-0-12-818305-2. 2020.

Selected Journal Publications

1. **Du, Z.\***, Hoffmann-Benning, S., Zienkiewicz, A., Zienkiewicz, K., Wang, S., Yin, L. 2021. Editorial: Lipid Metabolism in Development and Environmental Stress Tolerance for Engineering Agronomic Traits. Frontiers in Plant Science, DOI: 10.3389/fpls.2021.739786.
2. Shi, M., **Du, Z.**, Hua, Q., and Kai, G. 2021. CRISPR/Cas9-mediated targeted mutagenesis of bZIP2 in Salvia miltiorrhiza leads to promoted phenolic acid biosynthesis. Industrial Crops and Products 164: 113560.
3. Zhou, W., Li, S., Maoz, I., Wang, Q., Xu, M., Feng, Y., Hao, X., **Du, Z.\***, and Kai G. 2021. SmJRB1 positively regulates the accumulation of phenolic acid in Salvia miltiorrhiza. Industrial Crops and Products 164: 113417.
4. Guo, Z., Pogancev, G., Meng, W., **Du, Z.**, Liao, P., Zhang, R., Chye, M. 2020. The overexpression of rice ACYL-COA-BINDING PROTEIN4 improves salinity tolerance in transgenic rice. Environmental and Experimental Botany, 104349.
5. Meng, W., Xu, L., **Du, Z.**, Wang, F., Zhang, R., Song, X., Lam, S., Shui, G., Li, Y., and Chye, M. 2020. RICE ACYL-COA-BINDING PROTEIN6 affects acyl-CoA homeostasis and growth in rice. Rice, 13: 75.
6. Aznar-Moreno, J., Venegas-Calerón, M., **Du, Z.**, Garcés, R., Tanner, J., and Chye, M., Martínez-Force,

E., Salas, J. 2020. Characterization and function of a sunflower (Helianthus annuus L.) Class II acyl-CoA-binding protein. Plant Science, 300: 110630.

1. Liber, J., Bryson, A., Bonito, G., and **Du, Z.\*** 2020. Harvesting Microalgae for Food and Energy Products. Small Methods, 2000349.
2. Zienkiewicz, A., Zienkiewicz, K., Poliner, E., Pulman, J., **Du, Z.**, et al. 2020. The microalga Nannochloropsis during transition from quiescence to autotrophy in response to nitrogen availability. Plant Physiology, 182:819-839.
3. **Du, Z.**, Zienkiewicz, K., Vande Pol, N., Ostrom, N., Benning, C., and Bonito, C. Algal-fungal symbiosis leads to a photosynthetic mycelium. eLife, 2019;8:e47815.
4. O'Donnell, D., **Du, Z.**, Litchman, E. 2019. Experimental evolution of phytoplankton fatty acid thermal reaction norms. Evolutionary Applications, https://doi.org/10.1111/eva.12798.
5. **Du, Z.**, Alvaro, J., Hyden, B., Zienkiewicz, K., Benning, N., Zienkiewicz, A., Bonito, C., and Benning, C. 2018. Enhancing oil production and harvest by combining the marine alga Nannochloropsis oceanica and the oleaginous fungus Mortierella elongata. Biotechnology for Biofuels, 11: 174.
6. Poliner, E., Takeuchi, T., **Du, Z.**, Benning, C., Farré, E. 2018. Non-transgenic marker-free gene disruption by an episomal CRISPR system in the oleaginous microalga, Nannochloropsis oceanica CCMP1779. ACS Synthetic Biology, 7: 962-968.
7. **Du, Z.**, Lucker, B., Zienkiewicz, K., Millera, T., Zienkiewicz, A., Sears, B., Kramer, D., and Benning, C. 2018. Galactoglycerolipid Lipase PGD1 Is Involved in Thylakoid Membrane Remodeling in Response to Adverse Environmental Conditions in Chlamydomonas. The Plant Cell, 30: 447-465.
8. Zienkiewicz, K., Zienkiewicz, A., Poliner, E., **Du, Z.**, Vollheyde, K., Herrfurth, C., Marmon, S., Farré, E., Feussner, I., and Benning, C. 2017. Nannochloropsis, a rich source of diacylglycerol acyltransferases for engineering of triacylglycerol content in different hosts. Biotechnology for Biofuels, 10: 8.
9. Uehling, J., Gryganskyi, A., Hameed, K., Tschaplinski, T., Misztal, P., Wu, S., Desirò, A., Vande Pol, N.,

**Du, Z.** et al. 2017. Comparative genomics of Mortierella elongata and its bacterial endosymbiont

Mycoavidus cysteinexigens. Environmental Microbiology, 19: 2964-2983.

1. Zienkiewicz, K., **Du, Z.**, Ma W., and Benning, C. 2016. Neutral lipid biosynthesis in microalgae - molecular, cellular and physiological insight. Biochimica et Biophysica Acta, 1816: 1269-1281.
2. **Du, Z.**, Arias, T., Meng, W., and Chye, M. 2016. Plant acyl-CoA-binding proteins: An emerging family involved in plant development and stress responses. Progress in Lipid Research, 63: 165-181.
3. **Du, Z.**, Chen, M., Chen, Q., Gu, J., and Chye, M. 2015. Expression of Arabidopsis acyl-CoA-binding proteins AtACBP1 and AtACBP4 confers Pb(II) accumulation in Brassica juncea roots. Plant, Cell & Environment, 38: 101-117.
4. **Du, Z.**, Chen, M., Chen, Q., Xiao, S., and Chye, M. 2013a. Arabidopsis Acyl-CoA-Binding Protein ACBP1 participates in the regulation of seed germination and seedling development. The Plant Journal, 74: 294-309.
5. **Du, Z.**, Chen, M., Chen, Q., Xiao, S., and Chye, M. 2013b. Overexpression of Arabidopsis

Acyl-CoA-Binding Protein ACBP2 enhances drought tolerance. Plant, Cell & Environment, 36: 300-314.

1. **Du, Z.**, and Chye, M. 2013c. Interactions between Arabidopsis acyl-CoA-binding proteins and protein partners. Planta, 238: 239-245.
2. **Du, Z.**, Xiao, S., Chen, Q., and Chye, M. 2010a. Arabidopsis acyl-CoA-binding proteins ACBP1 and ACBP2 show different roles in freezing stress. Plant Signaling & Behaviour, 5: 607-609.
3. **Du, Z.**, Xiao, S., Chen, Q., and Chye, M. 2010b. Depletion of the membrane-associated

acyl-CoA-binding protein ACBP1 confers freezing tolerance in Arabidopsis. Plant Physiology, 152: 1585-1597.

1. **Du, Z.**, and Wang, Y. 2008. Significance of RT-PCR expression patterns of *CYC*-like genes in *Oreocharis benthamii* (Gesneriaceae). J. Syst. Evol. 46: 23-31.

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| **Patents** |
| 1. Bonito, G., **Du, Z.**, Benning, C. US Patent 10858687. Lipid biosynthesis and abiotic stress resilience in photosynthetic organisms. 2. Chye, M., **Du, Z.**, Chen, Q. WO/2013/064119. Methods using acyl-coenzyme a-binding proteins to enhance drought tolerance in genetically modified plants. 3. Chye, M., **Du, Z.**, Chen, Q. EP Patent EP2773765A4. Methods using acyl-coenzyme a-binding proteins to enhance drought tolerance in genetically modified plants. 4. Chye, M., **Du, Z.**, Chen, Q. CA Patent CA2854069C. Methods using acyl-coenzyme a-binding proteins to enhance drought tolerance in genetically modified plants. 5. Chye, M., **Du, Z.**, Chen, Q. CN Patent CN104080915B. Methods using acyl-coenzyme a-binding proteins to enhance drought tolerance in genetically modified plants. |

Creative Works (i.e., Extension Videos, Websites, Blogs, Creative Designs and Exhibitions, etc.)

<https://www2.hawaii.edu/~duz/> https://[www.youtube.com/watch?v=AoFZZtYIRYc](http://www.youtube.com/watch?v=AoFZZtYIRYc)

Leadership Roles (Committees, Boards, Advisory, etc.) Associate editor, Frontiers in Plant Science.

Advisory board member, AntiAlias Ventures (<https://theantialias.com/>).

# Graduate Students

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| Category | Current Number of Students | Number Graduated (Career) |
| Member of MS and PhD Committees | 8 | 0 |
| PhD students | 1 | 0 |
| MS students | 2 | 0 |

**Grant Support**

Title of Grant: RII Track-2 FEC: Genome Engineering to Sustain Crop Improvement (GETSCI) Source of Grant: NSF

Total Dollar Value (Your share of the grant value): $3,993,756 ($542,294.20) Dates of Grant: 10/01/2021-09/30/2025

Role: Co-PI

Title of Grant: Synthetic Bioengineering of Tropical Microalgae for the Production of High-Value Bioproducts

Source of Grant: USDA

Total Dollar Value (Your share of the grant value): $120,000

Dates of Grant: 04/16/2021-09/30/2025

Role: PI

Title of Grant: Developing a Biofiltration System with Fungal Filters for Sustainable and Economical Harvesting of Microalgae

Source of Grant: USDA

Total Dollar Value (Your share of the grant value): $47,969

Dates of Grant: 08/1/2022-07/31/2023

Role: PI

Title of Grant: USDA-HEC: Education of Novel CRISPR Technologies for Hawaii Undergraduate and Graduate Students

Source of Grant: USDA

Total Dollar Value (Your share of the grant value): $140,000

Dates of Grant: pending

Role: PI

# Recent presentations at Conferences

Title: Co-production of high-value biomaterials using algae-fungi symbiotic systems

Authors (put an asterisk on the presenter): Zhi-Yan Du

Name of Conference: International Conference on Plant productivity and food safety:

Soil science, Microbiology, Agricultural Genetics and Food quality, Poland, Sep 15-16, 2022

Location: Online

Date of Presentation: Sep 16, 2022

Title: Co-production of valuable compounds with algae-fungi symbiotic systems

Authors (put an asterisk on the presenter): Zhi-Yan Du

Name of Conference: Microbiology Seminar Series, UH Manoa, Sep 12, 2022

Location: WEB 113, UH Manoa

Date of Presentation: Sep 12, 2022

Title: Co-production of valuable compounds with algae-fungi symbiotic systems

Authors (put an asterisk on the presenter): Zhi-Yan Du

Name of Conference: The 61st annual meeting of the Phytochemical Society of North America (PSNA), Blacksburg, VA, Jul 24-28, 2022

Location: Viginia Tech, Blacksburg, VA

Date of Presentation: Jul 26, 2022

Title: New oil production system powered by a community of algae and fungi

Authors (put an asterisk on the presenter): Zhi-Yan Du

Name of Conference: Annual Meeting of The Multistate Research Project, S1075 USDA, Houston, TX, Jul 15-16, 2022

Location: Houston, TX

Date of Presentation: Jul 15, 2022

Title: Algal-fungal symbiosis leads to photosynthetic mycelium

Authors (put an asterisk on the presenter): Zhi-Yan Du\*, Christoph Benning, Gregory Bonito

Name of Conference: Algal BBB 2021 - The International Conference on Algal Biomass, Biofuels and Bioproducts, Jun 12-14, 2021

Location: Online, Live & On-Demand Date of Presentation: Jun 14, 2021

Title: Function and biosynthesis of lipids in microalgae Authors (put an asterisk on the presenter): Zhi-Yan Du

Name of Conference: 2021 Symposium of natural product biotechnology, Hong Zhou, China, Jan 18, 2021

Location: Online

Date of Presentation: Jan 18, 2021