Po-Ju Ke

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EDUCATION

2014-2019 **Ph.D., Department of Biology, Stanford University**
Dissertation title: "*Temporal development of plant-soil interactions and its effects on community dynamics*"
Advisor: Tadashi Fukami

2011-2013 **M.S., Forestry and Resource Conservation, National Taiwan University**
Thesis title: "*Plant trait and microbial composition interactively determine species variation in plant soil feedback - a modeling approach*"
Advisors: Tzung-Su Ding and Takeshi Miki

2007-2011 **B.S., Forestry and Resource Conservation, National Taiwan University**

PROFESSIONAL APPOINTMENTS

2021-present **Assistant professor, National Taiwan University**
Institute of Ecology and Evolutionary Biology

2019-2021 **Postdoctoral researcher, Princeton University**
Supervisor: Jonathan Levine

2013-2014 **Research assistant, National Taiwan University**
Supervisor: Takeshi Miki

PUBLICATIONS

Published & in press (google scholar profile)
2024

- [27] Miki, T., **Ke, P.-J.** (2024) Macroscale vertical power-law distribution of bacteria in dark oceans can emerge from microscale bacteria-particle interactions. *Journal of Theoretical Biology*, 595: 111956

- [26] Letten, A.D.*, Yamamichi, M., Richardson, J.A., **Ke, P.-J.*** (2024) Microbial dormancy supports multi-species coexistence under resource fluctuations. *Ecology Letters*, 27(9): e14507

- [25] Simha, A.*, James, A.*, Monk, J.D., Zou, H.-X., **Ke, P.-J.**, Wright, A., Bimler, M.D.,

Moore, C.M., Pierre, S., Carley, L.N., Kandlikar, G.S. (2024) When the window is a mirror: how do dominant theories limit our understanding of nature? (ESA 2023 INS23). *Bulletin of the Ecological Society of America*, 105(3): e02145

2023

- [24] Chung, Y.A., **Ke, P.-J.**, Adler, P.B. (2023) Mechanistic approaches to investigate soil microbe-mediated plant competition. *Journal of Ecology*, 111(8), 1590-1597

- [23] Spaak, J., Millet, R., **Ke, P.-J.**, Letten, A.D., De Laender, F. (2023) The effect of non-linear competitive interactions on quantifying niche and fitness differences. *Theoretical Ecology*, 16, 161-170

- [22] Blonder, B.W.*, Gaüzère, P.*, Iverson, L.L., **Ke, P.-J.**, Petry, W.K., Ray, C.A., Salguero-Gómez, R., Sharpless, W., Violle, C. (2023) Predicting and controlling ecological communities via trait and environment mediated parameterization of dynamical models. *Oikos*, 2023(6): e09415
  - Editor's choice

- [21] **Ke, P.-J.***, Wan, J.* (2023) A general approach for quantifying microbial effects on plant competition. *Plant & Soil*, 485, 57-75

- [20] Spaak, J., **Ke, P.-J.**, Letten, A.D., De Laender, F. (2023) Different measures of niche and fitness differences tell different tales. *Oikos*, 2023(4): e09573

- [19] Van Nuland, M.E., **Ke, P.-J.**, Wan, J., Peay, K.G. (2023) Mycorrhizal nutrient acquisition strategies shape tree species competition and coexistence dynamics. *Journal of Ecology*, 111(3), 564-577

2022

- [18] **Ke, P.-J.** (2022) Water shifts the balance of coexistence. *Nature Ecology & Evolution*, 6, 496-497

- [17] Ou, W.J.-A.*, Henriques, G.J.B.*, Senthilnathan, A., **Ke, P.-J.**, Grainger, T.N., Germain, R.M. (2022) Writing accessible theory in ecology and evolution: Insights from cognitive load theory. *BioScience*, 72(3), 300-313
  - See also recommendation by Ryan Chisholm, Faculty Opinions

- [16] DeMalach, N., **Ke, P.-J.**, Fukami, T. (2022) The effects of ecological selection on species diversity and trait distribution: predictions and an empirical test. *Ecology*, 103(1): e03567

- [15] Grainger, T.N., Senthilnathan, A.*, **Ke, P.-J.***, Barbour, M.A., Jones, N.T. *et al*. (2022) An empiricist's guide to using ecological theory. *The American Naturalist*, 199(1), 1-20
  - See also recommendation by Kimberley Mathot, Faculty Opinion

2021

- [14] Chang, C.-W., Miki, T., Ushio, M., **Ke, P.-J.**, Lu, H.-P., Shiah, F.-K., Hsieh, C.-h. (2021) Reconstructing large interaction networks from empirical time series data. *Ecology Letters*, 24(12), 2763-2774

- [13] **Ke, P.-J.**, Levine, J.M. (2021) The temporal dimension of plant-soil microbe interactions:

mechanisms promoting feedback between generations. *The American Naturalist*, 198(3), E80-E94

- [12] **Ke, P.-J.**, Zee, P.C., Fukami, T. (2021) Dynamic plant-soil microbe interactions: the neglected effect of soil conditioning time. *New Phytologist*, 231(4), 1546-1558

- [11] Tao, H.-H., Dur, G., **Ke, P.-J.**, Souissi, S., Hsieh, C.-h. (2021) Age-specific habitat preference, carrying capacity, and landscape structure determine the response of population spatial variability to fishing-driven age truncation. *Ecology and Evolution*, 11(11), 6358-6370

2020

- [10] Chang, F.-H., **Ke, P.-J.**, Cardinale, B. (2020) Weak intra-guild predation facilitates consumer coexistence but does not guarantee higher consumer density. *Ecological Modelling*, 424: 109019

- [9] **Ke, P.-J.***, Wan, J.* (2020) Effects of soil microbes on plant competition: A perspective from modern coexistence theory. *Ecological Monographs*, 90(1): e01391
  - Cover featured paper
  - Selected for Postdoctoral Excellence Award, ESA Plant Population Ecology section

2018

- [8] Smith, J.R., Letten, A.D., **Ke, P.-J.**, Anderson C.B., Hendershot, J.N. *et al*. (2018) A global test of ecoregions. *Nature Ecology & Evolution*, 2, 1889-1896
  - See also news cover in *Stanford News* by Rob Jordan "Stanford researchers unveil clues that could lead to more affordable and effective conservation of species"
  - Included in the collection of articles celebrating Alexander von Humboldt 250 anniversary in *Nature Ecology & Evolution*

- [7] **Ke, P.-J.***, Letten, A.D.* (2018) Coexistence theory and the frequency-dependence of priority effects. *Nature Ecology & Evolution*, 2, 1691-1695

- [6] Letten, A.D., Dhami, M.K., **Ke, P.-J.**, Fukami, T. (2018) Species coexistence through simultaneous fluctuation-dependent mechanisms. *Proceedings of the National Academy of Science of the United States of America*, 115(26), 6745-6750
  - Cover featured paper
  - See also news cover in *Stanford News* by Taylor Kubota "Stanford nectar research sheds lights to ecological theory"

- [5] **Ke, P.-J.**, Nakazawa, T. (2018) Ontogenetic antagonism-mutualism coupling: perspectives on resilience of stage-structured communities. *Oikos*, 127(3), 353-363

- [4] Miki, T.*, Yokokawa, T.*, **Ke, P.-J.**, Hsieh, I-F., Hsieh, C.-h., Kume, T., Yoneya, K., Matsui, K. (2018) Statistical recipe for quantifying microbial functional diversity from EcoPlate metabolic profiling. *Ecological Research*, 33(1), 249-260

2017

- [3] Letten, A.D.*, **Ke, P.-J.***, Fukami, T. (2017) Linking modern coexistence theory and contemporary niche theory. *Ecological Monograph*, 87(2), 161-177
  - Cover featured paper
  - Selected for Outstanding Ecological Theory Paper Award, ESA Theory section
  - See also recommendation by Da-Yong Zhang, Faculty Opinion

- Included in BES/ESA joint virtual issue, Biodiversity and Ecosystem Services

2015

- [2] **Ke, P.-J.**, Miki, T. (2015) Incorporating the soil environment and microbial community into plant competition theory. *Frontiers in Microbiology*, 6: 1066

- [1] **Ke, P.-J.**, Miki, T., Ding, T.-S. (2015) The Soil microbial community predicts the importance of plant traits in plant-soil feedback. *New Phytologist*, 206(1), 329-341
  - Cover featured paper
  - See also commentary article by Kardol *et al*. (2015) Peeking into the black box: a trait-based approach to predicting plant-soil feedback. *New Phytologist*, 206(1), 1-4
  - See also recommendation by Bernhard Schmid, Faculty Opinion

In revision/In review

- **Ke, P.-J.**, Kandlikar, G.S., Ou, S.X., Hsu, G.-C., Wan, J., Krishnadas, M. Time will tell: the temporal and demographic contexts of plant-soil microbe interactions. (*in review*)
  - See also preprint on *EcoEvoRxiv*, https://doi.org/10.32942/X2PS5N
- Wan, J.*, **Ke, P.-J.***, Hordijk, I., Bialic-Murphy, L., Crowther, T.W. Functional coexistence theory: a mechanistic framework linking biodiversity to ecosystem function. (*in revision*)
  - See also preprint on *bioRxiv*, https://doi.org/10.1101/2024.05.05.591902
- Miki, T., Chang, C.-W., **Ke, P.-J.**, Telschow, A., Tsai, C.-H., Ushio, M., Hsieh, C.-h. How to quantify interaction strengths? A critical rethinking of the interaction Jacobian and evaluation methods for non-parametric inference in time-series analysis (*in review*)
  - See also preprint on *arXiv*, https://arxiv.org/abs/2411.09030

In advanced preparation (Full draft available upon request)

- Ou, S.X., Kandlikar, G.S., Warren, M.L., **Ke, P.-J.** Realistic time-lags and litter dynamics alter predictions of plant-soil feedback across generations (*in prep.*)
  - See also preprint on *bioRxiv*, https://doi.org/10.1101/2024.01.25.577053
- Senthilnathan, A., **Ke, P.-J.**, Yan, X., Crawford, K., D'Andrea, R. Challenges in linking plant-soil feedbacks to community structure. (*in prep.*)

HONORS and AWARDS

2020	Postdoctoral Excellence Award in Plant Population Ecology Plant Population Ecology section of the Ecological Society of America
2017	Outstanding Ecological Theory Paper Award Theory section of the Ecological Society of America
2015	Volterra Award for the best student talk in mathematical ecology The 100th Annual Meeting of the Ecological Society of America
2014	Best English Presentation Award The 61st Annual Meeting of the Ecological Society of Japan
2013	Best Poster Award The 5th Taiwan-Korea-Japan International Symposium on Microbial Ecology
2012	Presentation Excellence Award The 3rd Taiwan-Japan Joint Workshop for Young Scholars in Applied Mathematics

INVITED SEMINAR PRESENTATIONS

2023 National Taiwan University (Taiwan). Department of Forestry and Resource Conservation
2022 National Taiwan University (Taiwan). Department of Entomology
2021 Kyoto University (Japan). Forest Ecosystem Function Colloquium
National Taiwan University (Taiwan). Department of Plant Pathology and Microbiology
2020 National Taiwan University (Taiwan). Global Change Research Center
National Sun Yat-sen University (Taiwan). Department of Biological Science
National Taiwan University (Taiwan). Institute of Ecology and Evolutionary Biology
National Taiwan Normal University (Taiwan). School of Life Science
2019 National Taiwan University (Taiwan). Institute of Ecology and Evolutionary Biology
2018 Netherlands Institute of Ecology (The Netherlands). Department of Terrestrial Ecology
2016 Stanford University (USA). Department of Earth System Science
2015 University of California San Francisco (USA). Center for Systems & Synthetic Biology
2014 National Cheng Kung University (Taiwan). Department of Life Sciences
2013 Tohoku University (Japan). Graduate School of Life Science

SELECTED CONFERENCE PRESENTATIONS

Contributed talks

2024 **Ke, P.-J.** Time will tell: the temporal context of plant-soil microbe interactions. The 71st Annual Meeting of the Ecological Society of Japan (2024/3, Yokohama, Japan)
Ke, P.-J., Tseng, Y.-P. Active drivers or passive islands? Bird's nest ferns (*Asplenium nidus*) as a novel system for studying microbial community assembly The 8th Mitalk (2024/1, Hualien, Taiwan)

2023 **Ke, P.-J.** Exploring the temporal dimensions of plant-soil microbe interactions. The 108th Annual Meeting of the Ecological Society of America (2023/8, Portland, USA)
Ke, P.-J., Wan, J. Quantifying microbial effects on plant coexistence using coexistence theory. The 70th Annual Meeting of the Ecological Society of Japan (2023/3, Virtual Annual Meeting)

2020 **Ke, P.-J.**, Levine, J. Demographic context and soil conditioning rate determine the effects of soil microbes on plant competitive outcome. The 105th ESA Annual Meeting (2020/8, Virtual Annual Meeting)

2018 **Ke, P.-J.**, Fukami, T. Dynamic plant-soil feedback: The neglected effect of soil cultivation length. The 103th ESA Annual Meeting (2018/8, New Orleans, USA)
Ke, P.-J., Fukami, T. The effect of soil cultivation length on plant-soil microbe interaction. Stand Along Conference of the American Society of Naturalists (2018/1, Asilomar, USA)

2017 **Ke, P.-J.**, Fukami, T. Interactive effects of aboveground competition and plant-soil feedbacks on plant species coexistence: Insight from modern coexistence theory. The 102nd ESA Annual Meeting (2017/8, Portland, USA)

2016 **Ke, P.-J.**, Fukami, T. The effect of plant age on soil microbial community structure. The 14th Annual UCSC/Stanford Species Interaction Workshop (2016/12, Santa Cruz, USA)

Ke, P.-J., Fukami, T. The effect of soil cultivation length by plants on soil microbial community structure. The 101th ESA Annual Meeting (2016/8, Fort Lauderdale, USA)

2015 **Ke, P.-J.**, Nakazawa, T. Herbivory-pollination coupling mediated by ontogenetic change in interaction type stabilizes community dynamics. The 100th ESA Annual Meeting (2015/8, Baltimore, USA)
Selected for ESA Volterra Award

2014 **Ke, P.-J.**, Miki, T., Ding, T.-S. Soil microbial community predicts the importance of plant traits in plant-soil feedback. The 12th Annual UCSC/Stanford Species Interaction Workshop (2014/12, Santa Cruz, USA)
Ke, P.-J., Miki, T., Ding, T.-S. Soil microbial composition alters the relative importance of plant traits in determining plant-soil feedback strength. The 61st Annual Meeting of the Ecological Society of Japan (2014/03, Hiroshima, Japan)
Selected for English Presentation Best Award

2013 **Ke, P.-J.**, Miki, T., Ding, T.-S. Litter decomposability and microbial composition interactively determine species variation in plant soil feedback – a theoretical approach. Symposium on Animal Behavior and Ecology (2013/01, Hualien, Taiwan)

2012 **Ke, P.-J.**, Miki, T., Ding, T.-S. Linking plant defense trait and negative plant-soil feedback – a theoretical approach. The 3rd Taiwan-Japan Joint Workshop for Young Scholars in Applied Mathematics (2012/02, Taipei, Taiwan)
Selected for Presentation Excellence Award

Contributed posters

2014 **Ke, P.-J.**, Nakazawa, T. Effects of herbivory-pollination coupling mediated by ontogenetic growth of insects on community dynamics. Congress on Animal Behavior and Ecology (2014/01, Taichung, Taiwan)

2013 **Ke, P.-J.**, Miki, T., Ding, T.-S. Soil microbial composition alters the effect of plant traits on species variation in plant soil feedback. The 5th Taiwan-Korea-Japan International Symposium on Microbial Ecology (2013/10, Jhongli, Taiwan)
Selected for Best Poster Award

2012 **Ke, P.-J.**, Miki, T., Ding, T.-S. What determines species variation in plant-soil feedback strength? Linking plant defense and litter traits through a theoretical approach. The 3rd Japan-Taiwan Ecological Workshop (2012/11, Sapporo, Japan)
Ke, P.-J., Miki, T., Ding, T.-S. Linking plant defense trait and negative plant-soil feedback – a theoretical approach. Joint Meeting of The 59th Annual Meeting of ESJ and The 5th EAFES International Congress (2012/03, Otsu, Japan)

GRANTS and FUNDINGS

2022-4 "*The temporal decay trajectory of plant-soil microbe interactions and its effects on plant community structure*," Taiwan Ministry of Science and Technology ($148,095)

2021-6 Yushan Scholar Program, Taiwan Ministry of Education ($540,310)

2018 Travel Grant, Modelling population dynamics with PSPM workshop ($1,200)
Eco-Evo Travel Grant, Stanford Biology Department ($500)
Education Travel Grant, Stanford Biosciences Office of Graduate ($600)

2017 Studying Abroad Scholarship, Taiwan Ministry of Education ($34,000)
Eco-Evo Travel Grant, Stanford Biology Department ($600)
Education Travel Grant, Stanford Biosciences Office of Graduate ($600)

2016 Eco-Evo Travel Grant, Stanford Biology Department ($600)
Education Travel Grant, Stanford Biosciences Office of Graduate ($600)

2015 Education Travel Grant, Stanford Biosciences Office of Graduate ($1,000)

2011 Foundation for the Advancement of Outstanding Scholarship Travel Grant ($1,500)
The Memorial Scholarship Foundation for Mr. Lin Hsiung Chen ($3,000)
Lungshan Temple Scholarship for Outstanding Students ($1,800)

TEACHING and MENTORING EXPERIENCE

Teaching

Spring semester	Biological Modelling (IPCS5049)
	Selected Papers in Community Ecology (EEB5098)
	Ecology (LS3023)
	Community Ecology (EEB5103)
	Mathematics for Life Science (LS5073)
Fall semester	Introduction to Theoretical Ecology (EEB5096)
	Introduction to R for Ecologists (EEB5082)
	Population Biology (LS3033)

Undergraduate student mentoring

2023/07-2023/08	NTU IEEB Summer Research Program (Ching-Ning Yeh)
2020/06-2020/08	Princeton Summer Research Program (Shigetatsu Nishigai)
2017/06-2017/08	Stanford VPUE Summer Research Program (Ben LeRoy, Nancy Chang)
2016/06-2016/08	Stanford VPUE Summer Research Program (Michelle Li, Anna Verwillow)

Postdoc mentoring

2023/10- present	Joe Wan

Graduate student mentoring

2024/08-present	Siang-Chi Huang (Master's program, IEEB)
2024/08-present	Kuan-Yu Chen (Master's program, IEEB)
2024/04-present	Hsiang-Chih Lo (Master's program, IEEB)
2022/08-2024/06	Yi Sun (Master's program, IEEB)

Research assistant mentoring

2024/05-present	Chin-Te Tsai

2023/10-2024/07 Ching-Lin Huang (Ph.D. at University of Minnesota)
2023/04-2023/09 Shuo Wei (Ph.D. at Yale University)
2022/10-2024/03 Yu-Pei Tseng (Ph.D. at University of Queensland)
2022/03-2023/06 Gen-Chang Hsu (Ph.D. at Cornell University)

ACADEMIC and SCIENTIFIC SERVICE

Journal editorial board
2023/06-present *Ecology Letters*

Professional society service
2017/12-2020/03 Student liaison of the Theoretical Ecology Section of ESA

Journal manuscript referee
American Naturalist
Ecology
Ecological Monographs
Ecology Letters
Ecological Research
Functional Ecology
Journal of Applied Ecology
Journal of Ecology
Journal of Theoretical Biology
Nature Ecology & Evolution
New Phytologist
Oikos
Plant and Soil
PNAS
Plos One
Proceedings of the Royal Society: B
Theoretical Ecology
Trends in Ecology and Evolution

Grant proposal and book referee
National Science Foundation, Division of Environmental Biology, USA (2020)
Springer, book chapter in "Diversity of Functional Traits and Interactions (Mougi A. eds; 2020)"

Seminar Organization
2015/09-2016/06 Organize Stanford Biology Department's Eco-Evo lunch seminar series