

# Po-Ju Ke

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## EDUCATION

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- 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

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- 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

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**Published & in press** ([google scholar profile](#))

2023

- [22] Blonder, B.\*, Gaüzère, P.\*, Iverson, L., **Ke, P.-J.**, Petry, W.K., Ray, C., Salguero-Gómez, R., Sharpless, W., Violle, C. (*in review*) Predicting and controlling ecological communities via trait and environment mediated parameterization of dynamical models. *Oikos*
- [21] Spaak, J., **Ke, P.-J.**, Letten, A.D., De Laender, F. (*in press*) Different measures of niche and fitness differences tell different tales. *Oikos*
- [20] Van Nuland, M.E., **Ke, P.-J.**, Wan, J., Peay, K.G. (*in press*) Mycorrhizal nutrient acquisition

strategies shape tree species competition and coexistence dynamics. *Journal of Ecology*

- [19] **Ke, P.-J.\***, Wan, J.\* (*in press*) A general approach for quantifying microbial effects on plant competition. *Plant & Soil*

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, Eva Kisdi, and Hanna ten Brink, 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, Jana Petermann, and Dan Flynn, Faculty Opinion

#### **In revision/In review**

- Spaak, J., Millet, R., **Ke, P.-J.**, Letten, A.D., De Laender, F. The effect of non-linear competitive interactions on quantifying niche and fitness differences. (*in review*)
  - See also preprint on *bioRxiv*, 2021.08.30.458252

#### **In advanced preparation** (Full draft available upon request)

- Chung, Y.A., **Ke, P.-J.**, Adler, P.B. Mechanistic approaches to investigate microbe-mediated plant competition. (*in prep.*)

- Miki, T., **Ke, P.-J.** Macroscale vertical power-law distribution of bacteria in dark oceans can emerge from microscale bacteria-particle interactions. (*in prep.*)

## HONORS and AWARDS

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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 100 <sup>th</sup> Annual Meeting of the Ecological Society of America
2014	Best English Presentation Award The 61 <sup>st</sup> Annual Meeting of the Ecological Society of Japan
2013	Best Poster Award The 5 <sup>th</sup> Taiwan-Korea-Japan International Symposium on Microbial Ecology
2012	Presentation Excellence Award The 3 <sup>rd</sup> Taiwan-Japan Joint Workshop for Young Scholars in Applied Mathematics

## INVITED PRESENTATIONS

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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

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### Contributed talks

2020	<b>Ke, P.-J.</b> , Levine, J. Demographic context and soil conditioning rate determine the effects of soil microbes on plant competitive outcome. The 105 <sup>th</sup> ESA Annual Meeting (2020/8, Virtual Annual Meeting)
2018	<b>Ke, P.-J.</b> , Fukami, T. Dynamic plant-soil feedback: The neglected effect of soil cultivation length. The 103 <sup>th</sup> ESA Annual Meeting (2018/8, New Orleans, USA) <b>Ke, P.-J.</b> , 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 102<sup>nd</sup> ESA Annual Meeting (2017/8, Portland, USA)
- 2016 **Ke, P.-J.**, Fukami, T. The effect of plant age on soil microbial community structure. The 14<sup>th</sup> 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 101<sup>th</sup> 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 100<sup>th</sup> 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 12<sup>th</sup> 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 61<sup>st</sup> 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 3<sup>rd</sup> 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 5<sup>th</sup> 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 3<sup>rd</sup> 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 59<sup>th</sup> Annual Meeting of ESJ and The 5<sup>th</sup> EAFES International Congress (2012/03, Otsu, Japan)

## GRANTS and FUNDINGS

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- 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

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### Teaching

- Spring semester      Biological Modelling (IPCS5049)  
Selected Papers in Community Ecology (EEB5098, even-numbered years)  
Ecology (LS3023)
- Fall semester      Introduction to Theoretical Ecology (EEB5096)  
Introduction to R for Ecologists (EEB5082)  
Population Biology (LS3033, odd-numbered years)

### Teaching assistance

- 2017/01-2017/03      Introduction to Research in Ecology and Evolutionary Biology  
Stanford University
- 2015/10      Guest lecture: Positive interactions in community ecology  
University of San Francisco (Invited by: Matt Knope)
- 2015/09-2015/12      Ecology  
Stanford University
- 2012/09-2013/06      Introduction to Forest Biodiversity  
National Taiwan University
- 2012/02      Forest Camp Practice  
National Taiwan University
- 2011/09-2012/01      Basics in Theoretical Ecology  
National Taiwan University

**Undergraduate student mentoring**

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)

**Graduate student mentoring**

2022/08-in progress      Yi Sun (Master's program, IEEB)

**Research assistant mentoring**

2022/03-present      Gen-Chang Hsu  
2022/10-present      Yu-Pei Tseng

**ACADEMIC and SCIENTIFIC SERVICE**

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**Seminar Organization**

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

**Professional society service**

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

**Journal manuscript referee**

<i>American Naturalist</i>	<i>New Phytologist</i>
<i>Ecology</i>	<i>Oikos</i>
<i>Ecological Monographs</i>	<i>Plant and Soil</i>
<i>Ecology Letters</i>	<i>PNAS</i>
<i>Functional Ecology</i>	<i>Plos One</i>
<i>Journal of Applied Ecology</i>	<i>Proceedings of the Royal Society: B</i>
<i>Journal of Ecology</i>	<i>Theoretical Ecology</i>
<i>Nature Ecology &amp; Evolution</i>	<i>Trends in Ecology and Evolution</i>

**Grant proposal and book referee**

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