Guopeng Liang, Ph.D.

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EDUCATION

Ph.D. in *Ecology* 2016 - 2021
Utah State University, Logan, UT.
M.S. in *Soil Science* 2013 - 2016
Chinese Academy of Agricultural Sciences, Beijing, China.
B.S. in *Agricultural Resources and Environment*/Laws 2009 - 2013
Shandong Agricultural University, Tai'an, China

PROFESSIONAL EXPERIENCE

Postdoctoral associate, University of Minnesota 2022 -

RESEARCH INTERESTS

Global Change Ecology, Ecosystem Carbon Cycling, Plant Ecology, Soil Biogeochemistry, Plant-Soil-Microbe Interactions

PEER-REVIEWED PUBLICATIONS (available at Google Scholar and ResearchGate)

(Google Scholar: H index = 14, 660+ citations)

In review, revision, or preparation:

1. **Liang, G.,** Sasha, R., Stark, J., Waring, B (2022) Effects of multiple global change factors on soil respiration in a dryland ecosystem. Submitted to ***Soil Biology and Biochemistry***.
2. **Liang, G** (2022) Long-term nitrogen fertilization mitigates global food insecurity by not only increasing crop yield but also promoting its stability and sustainability. ***Global Food Security***. In review.
3. Li, S., Lu, J., **Liang, G**., Wu, X., Zhang, M., Plougonven, E., Wang, Y., Gao, L., Abdelrhman, A., Song, X., Liu, X., Degré, A (2022) Does soil water repellency reduce corn yield by changing soil water availability under long-term tillage management? ***SOIL***. In revision.
4. Yin, S., **Liang, G.,** Wang, C., Zhou, Z (2022) Temporal niche differentiation between plants and soil microorganisms is common in nature. ***Soil Biology and Biochemistry.*** In review.
5. Cai, A., Ren, T., Tang, S., Han, T., Wang, B., Smreczak, B., Ukalska-Jaruga., **Liang, G**., Zhou, Z (2022) Positive rhizosphere effect on soil carbon is dominantly controlled by abiotic rather than biotic factors across global agroecosystem. ***Global Biogeochemical Cycles***. In review.
6. Wen, J., Brahney, J., Sun, N., Zheng, J., Ji, H., Kang, H., Du, B., **Liang, G**., Umair, M., Lin, Y., Ma, Z., Liu, C (2022) Plant functional type is the primary driver of allometric scaling relationships between leaf nitrogen and phosphorus across a gradient in P availability in a subtropical forest ecosystem. ***Plant Ecology***. In review.

7. Song, X., Li, J., Liu, X., **Liang, G.,** Li, S., Zhang, M., Zheng, F., Wang, B., Wu, X., Wu, H (2022) Higher microbial carbon use efficiency and labile carbon retention contributes to mitigating priming effect under long-term tillage systems. ***Soil Biology and Biochemistry.*** In revision.
8. Gao, H., Xi, Y., Wu, X., Pei, X., **Liang, G.,** Bai, J., Song, X., Liu, X., Han, Z., Zhao, G., Li, S (2022) The involvement of manure leads to lower nitrous oxide emission with maintained yield than synthetic fertilizer in a winter wheat system, China. ***Agriculture, Ecosystems & Environment***. In review.

Published:

1. **Liang, G.,** Sun, P., Waring, B (2022) Nitrogen agronomic efficiency under nitrogen fertilization does not change over time in the long term: evidence from 477 global studies. ***Soil and Tillage Research***.
2. Song, X., Li, J., Liu, X., **Liang, G**., Li, S., Zhang, M., Zheng, F., Wang, B., Wu, X., Wu, H (2022) Altered microbial resource limitation regulates soil organic carbon sequestration based on ecoenzyme stoichiometry under long-term tillage systems. ***Land Degradation and Development.***
3. Liu, X., Li, Q., Tan, S., Wu, X., Song, X., Gao, H., Han, Z., Jia, A., **Liang, G**., Li, S (2022) Evaluation of carbon mineralization and its temperature sensitivity in different soil aggregates and moisture regimes: A 21-year tillage experiment. ***Science of the Total Environment***.
4. Waring, B., Gee, A., **Liang, G**., Adkins, S (2022) How much do the microbes matter? A quantitative analysis of microbial community structure-function relationships in litter decay. ***iScience***.
5. Liu, X., Tan, S., Song, X., Wu, X., Zhao, G., Li, S., **Liang, G** (2022) Response of soil organic carbon content to crop rotation and its controls: A global synthesis. ***Agriculture, Ecosystems & Environment***.
6. **Liang, G.,** Luo, Y., Zhou, Z., Waring, B (2021) Nitrogen effects on plant productivity change at decadal timescales. ***Global Ecology and Biogeography***.
7. Lu, J., Li, S., **Liang, G**., Wu, X., Zhang, Q., Gao, C., Li, J., Jin, D., Zheng, F., Zhang, M., Abdelrhman, A., Degré, A (2021) The contribution of microorganisms to soil organic carbon stock under fertilization varies among aggregate size classes. ***Agronomy***.
8. Liu, X., Wu, X., **Liang, G**., Zheng, F., Li, S (2021) A global meta-analysis of the impacts of no-tillage on soil aggregation and aggregate-associated organic carbon. ***Land Degradation and Development.***
9. Lu, J., Li, S., Wu, X., **Liang, G**., Gao, C., Li, J., Jin, D., Wang, B., Zhang, M., Zheng, F., Degré, A (2021) The dominant microorganisms vary with aggregates sizes in promoting soil C accumulation under straw application. ***Archives of Agronomy and Soil Science***.
10. Xu, H., Cai, A., Wu, D., **Liang, G**., Xiao, J., Gao, Q., Li, Y., Zhang, W., Xu, M (2021) Effects of biochar application on crop productivity, soil carbon sequestration, and global warming potential controlled by biochar C:N and soil pH: a global meta-analysis. ***Soil and Tillage Research***. 213: 105125
11. **Liang, G**., Wu, X., Cai, A., Dai, H., Zhou, L., Cai, D., Houssou, A.A., Gao, L., Wang, B., Li, S., Song, X., Wu, H (2021) Correlations among soil biochemical parameters, crop yield, and soil

respiration vary with growth stage and soil depth under fertilization. ***Agronomy Journal***. 113: 2450–2462

12. Li, S., Tan, D., Wu, X., Degré, A., Long, H., Zhang, S., Lu, J., Gao, L., Zheng, F., Liu, X., **Liang, G** (2021) Negative pressure irrigation increases vegetable water productivity and nitrogen use efficiency by improving soil water and NO_3-N distributions. ***Agricultural Water Management*** 251: 106853
13. Li, S., Lu, J., **Liang, G**., Wu, X., Zhang, M., Plougonven, E., Wang, Y., Gao, L., Abdelrhman, A., Song, X., Liu, X., Degré, A (2021) Factors governing soil water repellency under tillage management: the role of pore structure and hydrophobic substances. ***Land Degradation and Development*** 32: 1046–1059
14. Wilcox, K., Komatsu, K., Avolio, M., **C2E consortium** (2020) Improving collaborations between empiricists and modelers to advance grassland community dynamics in ecosystem models. ***New Phytologist*** 228: 1467–1471
15. Cai, A., **Liang, G.**, Yang, W., Zhu, J., Han, T., Zhang, W., Xu, M (2020) Patterns and driving factors of litter decomposition across Chinese terrestrial ecosystems. ***Journal of Cleaner Production*** 278: 23964.
16. Li, Y., Li, Z., Cui S., **Liang, G**., Zhang, Q (2020) Microbial-derived carbon components are critical for enhancing soil organic carbon in no-tillage croplands: A global perspective. ***Soil and Tillage Research*** 105: 104758
17. Li, S., Wu, X., **Liang, G.,** Gao, L., Wang, B., Lu, J., Abdelrhman, A., Song, X., Zhang, M., Zheng, F., Degré, A (2020) Is least limiting water range a useful indicator of the impact of tillage management on maize yield? ***Soil and Tillage Research*** 199: 104602.
18. Cai, A., Chang, N., Zhang, W., **Liang, G.,** Zhang, X., Hou, E., Jiang, L., Chen, X., Xu, M., Luo, Y (2020) The spatial patterns of litter turnover time in Chinese terrestrial ecosystems. ***European Journal of Soil Science*** 71: 856-867.
19. Gao, L., Wang, B., Li, S., Han, Y., Zhang, X., Gong, D., Ma, M., **Liang, G**., Wu, H., Wu, X., Cai, D., Degré, A (2019) Effects of different long-term tillage systems on the composition of organic matter by ^{13}C CP/TOSS NMR in physical fractions in the Loess Plateau of China. ***Soil and Tillage Research*** 194: 104321.
20. Wang, B., Yu, W., Wu, X., Gao, L., Li, J., Li, S., Liu, C., Li, Q., **Liang, G**., Cai, D., Zhang, J (2019) Effect of straw addition on the formation of aggregates and accumulation of organic carbon in dryland soil. ***Scientia Agricultura Sinica*** 9: 1553-1563. (in Chinese with English abstract)
21. Wang, B., Gao, L., Yu, W., Wei, X., Li, S., Li, J., **Liang, G.**, Song, X., Cai, D., Wu, X (2019) Soil aggregates and organic carbon distribution in deep soil under dryland long-term tillage and residue retention. ***Journal of Arid Land*** 11: 241-254.
22. Wang, J., Yang, Q., Zhai, D., Jiang, L., **Liang, G.**, Qiao, Y., Sun, X., Wei, N., Wang, X., Xia, J (2019) Relative contributions of biotic and abiotic factors to the spatial variation of litter stock in an old-growth subtropical forest. ***Journal of Plant Ecology*** 12: 769–780
23. Qiao, Y., Wang, J., **Liang, G.**, Du, Z., Zhou, J., Zhu, C., Huang, K., Zhou, X., Luo, Y., Yan, L., Xia, J (2019) Global variation of soil microbial carbon-use efficiency in relation to growth temperature and substrate supply. ***Scientific Reports*** 9: 5621.

24. Cai, A., Xu, M., Wang, B., Zhang, W., **Liang, G**., Hou, E., Luo, Y (2019) Manure acts as a better fertilizer for increasing crop yields than synthetic fertilizer does by improving soil fertility. ***Soil and Tillage Research*** 189: 168-175.
25. **Liang, G.**, Cai, A., Wu, H., Wu, X., Houssou, A.A., Ren, C., Wang, Z., Gao, L., Wang, B., Li, S., Song, X., Cai, D (2019) Soil biochemical parameters in the rhizosphere contribute more to changes in soil respiration and its components than those in the bulk soil under nitrogen application in croplands. ***Plant and soil*** 435: 111-125.
26. Gao, L., Wang, B., Li, S., Wu, H., Wu, X., **Liang, G.**, Gong, D., Zhang, X., Cai, D., Degré, A (2019) Soil wet aggregate distribution and pore size distribution under different tillage systems after 16 years in the Loess Plateau of China. ***Catena*** 173: 38-47.
27. Song, X., Wu, H., Wu, X., Li, Q., Wang, B., Li, S., **Liang, G**., Li, J., Liu, C., Zhang, M (2018) Long-term conservation tillage improves surface soil carbon and nitrogen content and rhizosphere soil enzyme activities. ***Journal of Plant Nutrition and Fertilizer*** 24: 1588-1597. (in Chinese with English abstract)
28. Cai, A., **Liang, G.**, Zhang, X., Zhang, W., Li, L., Rui, Y., Xu, M., Luo, Y (2018) Long-term straw decomposition in agro-ecosystems described by a unified three-exponentiation equation with thermal time. ***Science of the Total Environment*** 636: 699-708.
29. **Liang, G.**, Wu, H., Houssou, A.A., Cai, D., Wu, X., Gao, L., Wang, B., Li, S (2018) Soil respiration, glomalin content, and enzymatic activity response to straw application in a wheat-maize rotation system. ***Journal of Soils and Sediments*** 18: 697-707.
30. Gao, L., Becker, E., **Liang, G.**, Houssou, A.A., Wu, H., Wu, X., Cai, D., Degré, A (2017) Effect of different tillage systems on aggregate structure and inner distribution of organic carbon. ***Geoderma*** 288: 97-104.
31. Li, S., Wu, X., Dang J., Pei, X., Gao, L., Li, J., Wang, B., **Liang, G.**, Long, H (2017) Effects of negative pressure irrigation on yield, quality and water and nitrogen use efficiency of cucumber. ***Soil and Fertilizer Sciences in China*** 2: 55-62. (in Chinese with English abstract)
32. Li, S., Wu, X., Long, H., Zhang, S., Wang, X., **Liang, G.**, Gao, L., Li, J., Wang, B., Hao, X., Li, J., Zhang, S (2017) Water and nitrogen use efficiencies of cucumber under negatively pressurized fertigation. ***Journal of Plant Nutrition and Fertilizer*** 23: 416-426. (in Chinese with English abstract)
33. Houssou, A.A., **Liang, G.**, Gao, L., Li, J., Wu, X., Wu, H., Wang, X., Cai, D (2016) Effect of conservation tillage on soil respiration rate and water content under wheat/maize system in North China Plain. ***Journal of Soil Science and Environmental Management*** 7: 10-22.
34. **Liang, G.**, Houssou, A.A., Wu, H., Wu, X., Cai, D., Gao, L., Li, J., Wang, B., Li, S (2016) Soil nitrogen content and enzyme activities in the rhizosphere and non-rhizosphere of summer maize under different application rates. ***Chinese Journal of Applied Ecology*** 27: 1917-1924. (in Chinese with English abstract)
35. **Liang, G.**, Houssou, A.A., Wu, H., Cai, D., Wu, X., Gao, L., Li, J., Wang, B., Li, S (2015) Seasonal patterns of soil respiration and related soil biochemical properties under nitrogen addition in winter wheat field. ***PLoS ONE*** 10(12): e0144115.

36. Houssou, A.A., **Liang, G.**, Gao, L., Wu, X., Wu, H., Wang, X., Cai, D (2015) Effect of conservation tillage on soil respiration, organic carbon, moisture and yield of wheat /maize system on North China Plain. ***International Journal of Science and Research*** 4: 2460-2467.
37. Wang, B., Wu, X., Yu, W., Yang, Y., Wang, X., Li, J., **Liang, G.**, Cai, D (2015) Different carbon and nitrogen managements on soil respiration of spring maize farmland. ***Soil and Fertilizer Sciences in China*** 4: 1-7. (in Chinese with English abstract)
38. Wang, B., Cai, D., Li, J., **Liang, G.**, Yu, W., Wang, X., Yang, Y., Wang, X (2015) Effects of long-term conservation tillage on soil organic carbon, corn yield and water utilization. ***Journal of Plant Nutrition and Fertilizer*** 21: 1455-1464. (in Chinese with English abstract)
39. Li, J., Wu, H., Wu, X., Cai, D., Wang, B., **Liang, G.**, Yao, Y., Lv, J (2015) Effects of 15-year conservation tillage on soil and aggregate organic carbon sequestration in the Loess Hilly Region of China. ***Scientia Agricultura Sinica*** 48: 4690-4697. (in Chinese with English abstract)
40. Dou, Q., Wang, J., Yin, B., **Liang, G.**, Cui, X (2015) Alleviating effects of exogenous EBR on tomato seedlings during copper stress. ***Plant Physiology Journal*** 3: 287-294. (in Chinese with English abstract)
41. Yin, B., **Liang, G.**, Jia, W., Cui, X (2014) Exogenous EBR mediated the plant growth and absorption and accumulation of Cu, Fe and Zn in tomato seedlings under Cu stress. ***Chinese Journal of Eco-Agriculture*** 22: 578-584. (in Chinese with English abstract)
42. Zhang, M., **Liang, G.**, Jiang, C., Cui, X (2014) Exogenous nitric oxide involved in the accumulation and subcellular distribution of Fe, Zn and Mn in tomato seedlings under copper stress. ***Journal of Plant Nutrition and Fertilizer*** 3: 670-680. (in Chinese with English abstract)

TEACHING EXPERIENCE

- Teaching Assistant, Biology lab. Utah State University, Fall 2019.
- Teaching Assistant, Microbiology lab. Utah State University, Spring 2019.
- Teaching Assistant, Agricultural Water Resources and Utilization, Chinese Academy of Agricultural Sciences, Spring 2014.
- Teaching Assistant, Modern Soil Tillage, Chinese Academy of Agricultural Sciences, Fall 2013.

MENTORING EXPERIENCE

- Yundi Bai (2020 - 2021), master student at Imperial College London.
- Camilla Moses (2020 - 2021), undergraduate technician at Utah State University.
- Jalynn Jones (2019 - 2021), undergraduate technician at Utah State University.
- Preston Christensen (2018 - 2019), undergraduate technician at Utah State University.

ACADEMIC SERVICE

- **Guest editor** for ***Agronomy***
- **Journal peer review** (> 110 reviews, verified by Publons): Agricultural Water Management, Agricultural and Forest Meteorology, Agronomy, Applied Soil Ecology, Archives of Agronomy and Soil Science, CATENA, Environmental Microbiology, Environmental Research, Field Crops Research, Geoderma, Global Change Biology, Global Ecology and Biogeography, Heliyon, Journal of Agronomy and Crop Science, Journal of Environmental Management, Journal of Cleaner Production, Land Degradation & Development, Plant & Soil, PLOS ONE, Soil & Tillage Research

GRANTS

- **Guopeng Liang.** Modeled carbon cycle responses to altered precipitation and interannual variation in desert grasslands. Sevilleta LTER Graduate Fellowship funded by Sevilleta LTER. 2018. **$4,000**.
- **Guopeng Liang.** The impacts of manure on vegetable growth. Undergraduate Fellowship funded by Tai'an Environmental Protection Agency, China. 2011. **$1,000**.

AWARDS

- **Joseph E. Greaves Endowed Scholarship ($3,000), 2021**

Sponsored by Utah State University

- **Travel Award for attending SSSA meeting ($500), 2020**

Sponsored by Utah State University

- **IPNI Scholarship ($2,000), 2016**

Sponsored by International Plant Nutrition Institute (IPNI)

- **Monsanto Scholarship ($1,000), 2016**

Sponsored by Monsanto Company

- **Best Oral Presentation, 2016**

Sponsored by Symposium for Chinese Young Soil Scientists

- **Academic Scholarship, 2013-2014**

Sponsored by Chinese Academy of Agricultural Sciences

- **Outstanding Student in Social Work, 2011-2012**

Sponsored by Shandong Agricultural University

- **Academic Scholarship, 2011-2012**

Sponsored by Shandong Agricultural University

- **Second prize of Environmental design contest, 2011**

Sponsored by Shandong Society of Environmental Sciences

OUTREACH ACTIVITIES

- Proposal reviewer for 2019 Biology Graduate Student Association (BGSA) award sponsored by Department of Biology at Utah State University.
- Member of both the Ecology Center Seminar Committee in 2019 and the Biology Department Seminar Committee in 2021 at Utah State University to invite and host seminar speakers.

METHODS EXPERTISE

Design, installation, and maintenance of manipulative experiments in the field (treatments included: different nitrogen application levels, straw, inorganic and organic fertilizer application, warming and altered precipitation amount).

Design and maintenance of incubation experiments in the laboratory (treatments included: rewetting cycles and artificial root-soil systems [e.g. different inoculums, different substrate types, and different soil clay contents]).

Soil respiration: Li-COR 8100 soil CO_2 flux chamber in the field; gas chromatography and PICARRO in the lab.

Leaf photosynthesis: Li-COR 6400.

Biological soil analyses: microbial biomass (using chloroform fumigation extraction); enzyme activities (using fluorimetric assays); glomalin content (using Bradford method); soil DNA extraction (using DNA extraction kit); PCR.
Physical and chemical soil analyses: pH (using probe in laboratory); soil bulk density; total carbon and nitrogen (Elementar Analysen-systeme GmbH); available nitrogen (using a flow injection autoanalyzer); aggregate size distribution (wet sieving); density-based fractionation of soil organic carbon (using SPT).
Isotope technique: using ^{13}C-glucose to measure soil microbial carbon use efficiency.
Statistical analysis: QIIME; using R to run ANOVA and regression, structural equation modeling, PCA and RDA analysis, and boosted regression trees.
Scientific graphing software: R; Sigmaplot; Origin.
Synthesis of ecological data using meta-analysis: using engauge digitizer and package "metafor" in R.
Earth system models: Terrestrial ECOsystem (TECO) model (using Fortran).