

Thesis Opportunity (for bachelor or master students):

"Microclimate mediated effects of tree species diversity on soil functioning in a subtropical Chinese forest tree diversity experiment (BEF-China)"

Are you passionate about biodiversity research and eager to gain hands-on experience in an international research project? Are you interested in soil ecology? Awesome, because we are offering an exciting thesis opportunity within the BEF-China experimental platform in Jiangxi province, subtropical China (<u>https://bef-china.com/</u>) – a region of outstanding biodiversity!

Background

Recent studies highlight the positive impact of tree species diversity on ecosystem functioning (Depauw et al., 2024). In the face of climate change, forests play a crucial role in buffering temperature extremes. Research shows that diverse tree communities can create a more stable aboveground microclimate (Schnabel et al., 2023; Zhang et al., 2022). However, little is known about the buffering effect of tree species diversity on the *belowground* climate, despite its key role in supporting soil functions (Beugnon et al., 2024; Huang et al., 2024). Therefore, this study aims to investigate the effects of soil microclimate on two key soil functions—fungal biomass and decomposition. Both of them are of great ecological importance, as they are vital to the global carbon balance and are likely influenced by climate-driven processes (Hawkins et al., 2023).

Your Research

As part of Project P8G of the international research training group TreeDì - 林地, your thesis will focus on how tree and shrub species richness influence fungal biomass and



View on the experimental plots of BEF-China (Site B) in 2024.

decomposition, mediated by the local soil microclimate. To investigate this, wood sticks (to measure decomposition) and ingrowth mesh bags (to measure fungal biomass) were already placed near microclimate data loggers in BEF-China. Your work will involve retrieving and analysing these samples to test the overarching hypothesis that greater tree and shrub diversity stabilizes the soil microclimate, thereby enhancing soil functioning.

Fieldwork & Laboratory Work

Fieldwork will take place at the BEF-China experimental platform in Jiangxi province, China, from August 17 to late September or early October 2025. Your main tasks will include helping with the soil sampling campaign of TreeDì and simple lab work, such as weighing wood sticks on-site. Additionally, you will collaborate with local partner labs for fungal biomass analysis, while microclimate data will be provided in consultation with our Chinese colleagues.



What You Bring

- Enthusiasm for biodiversity research and soil ecology!
- Ability to work in an international team
- Willingness to work in challenging conditions (hot and humid climate)
- Basic skills in statistical data analysis
- English (basic level) (Chinese language skills are a plus)

Important Information

Please note: Fieldwork is physically demanding, and local hygienic conditions differ from European standards. Flights and accommodation will be covered by TreeDì. Supervision will be conducted by me, Tobias, as part of the working group <u>Experimental Interaction Ecology</u> sitting at the <u>German Centre for Integrative Biodiversity Research (iDiv)</u>, located in Leipzig. If you are interested, please send an email. I will consider your application and come back to you as soon as possible. The deadline for applications is **01.05.2025**, in order to have enough preparation time for visa applications, vaccinations etc. If you're excited about this opportunity, I'd love to hear from you!



Experimental setup within the plots.

Contact

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Relevant literature

- Beugnon, R., Le Guyader, N., Milcu, A., Lenoir, J., Puissant, J., Morin, X., & Hättenschwiler, S. (2024). Microclimate modulation: An overlooked mechanism influencing the impact of plant diversity on ecosystem functioning. *Global Change Biology*, *30*(3), e17214. https://doi.org/10.1111/gcb.17214
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- Hawkins, H.-J., Cargill, R. I. M., Van Nuland, M. E., Hagen, S. C., Field, K. J., Sheldrake, M., Soudzilovskaia, N. A., & Kiers, E. T. (2023). Mycorrhizal mycelium as a global carbon pool. *Current Biology*, 33(11), R560–R573. https://doi.org/10.1016/j.cub.2023.02.027
- Huang, Y., Stein, G., Kolle, O., Kübler, K., Schulze, E.-D., Dong, H., Eichenberg, D., Gleixner, G., Hildebrandt, A., Lange, M., Roscher, C., Schielzeth, H., Schmid, B., Weigelt, A., Weisser, W. W., Shadaydeh, M., Denzler, J., Ebeling, A., & Eisenhauer, N. (2024). Enhanced stability of grassland soil temperature by plant diversity. *Nature Geoscience*, *17*(1), 44–50. https://doi.org/10.1038/s41561-023-01338-5
- Schnabel, F., Beugnon, R., Yang, B., Richter, R., Eisenhauer, N., Huang, Y., Liu, X., Wirth, C., Cesarz, S., Fichtner, A., Perles-Garcia, M. D., Hähn, G. J. A., Härdtle, W., Kunz, M., Izaguirre, N. C. C., Niklaus, P. A., von Oheimb, G., Schmid, B., Trogisch, S., ... Bruelheide, H. (2023). Tree diversity increases forest temperature buffering. *bioRxiv*, 2023.09.11.556807. https://doi.org/10.1101/2023.09.11.556807
- Zhang, S., Landuyt, D., Verheyen, K., & De Frenne, P. (2022). Tree species mixing can amplify microclimate offsets in young forest plantations. *Journal of Applied Ecology*, 59(6), 1428–1439. https://doi.org/10.1111/1365-2664.14158