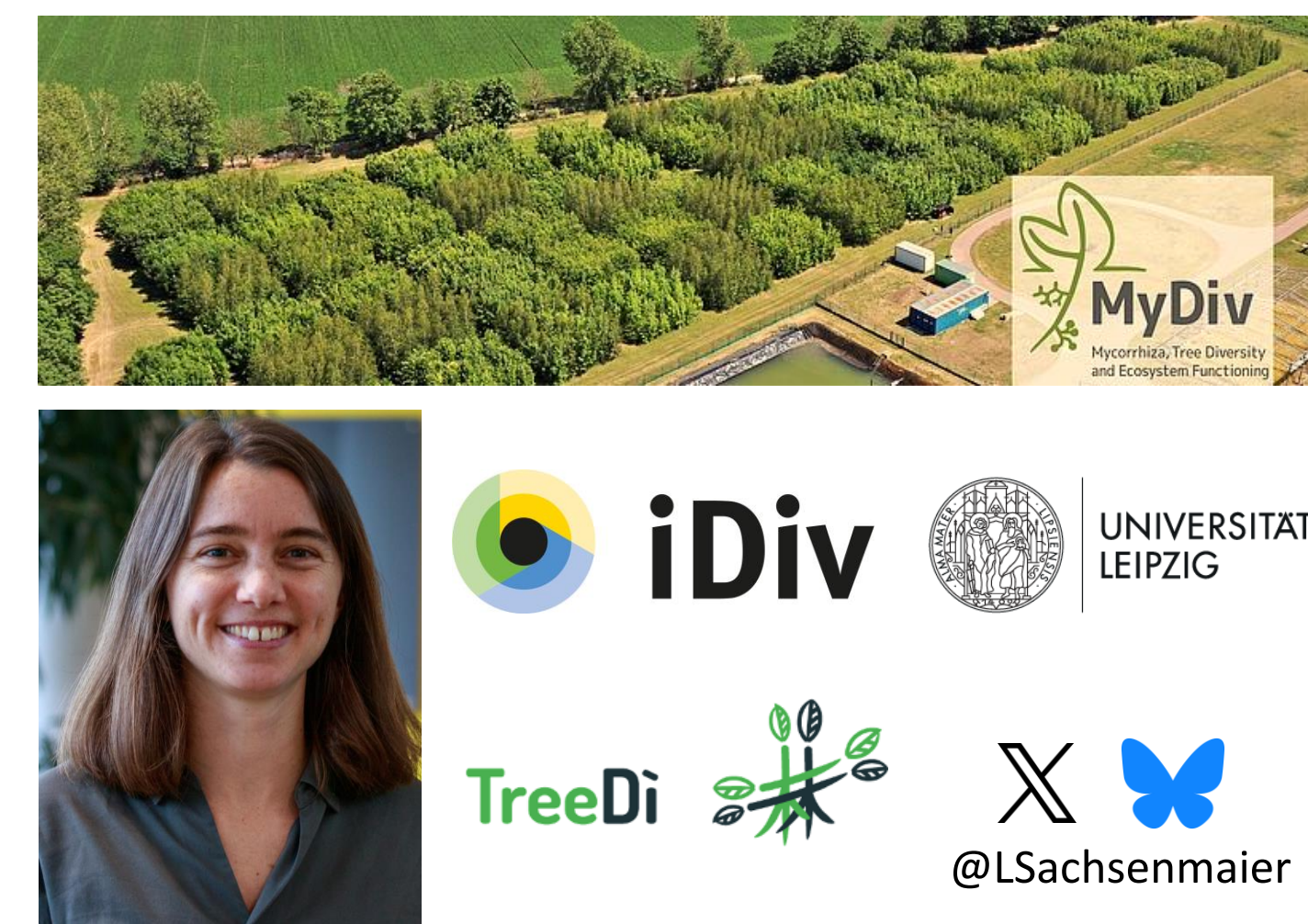
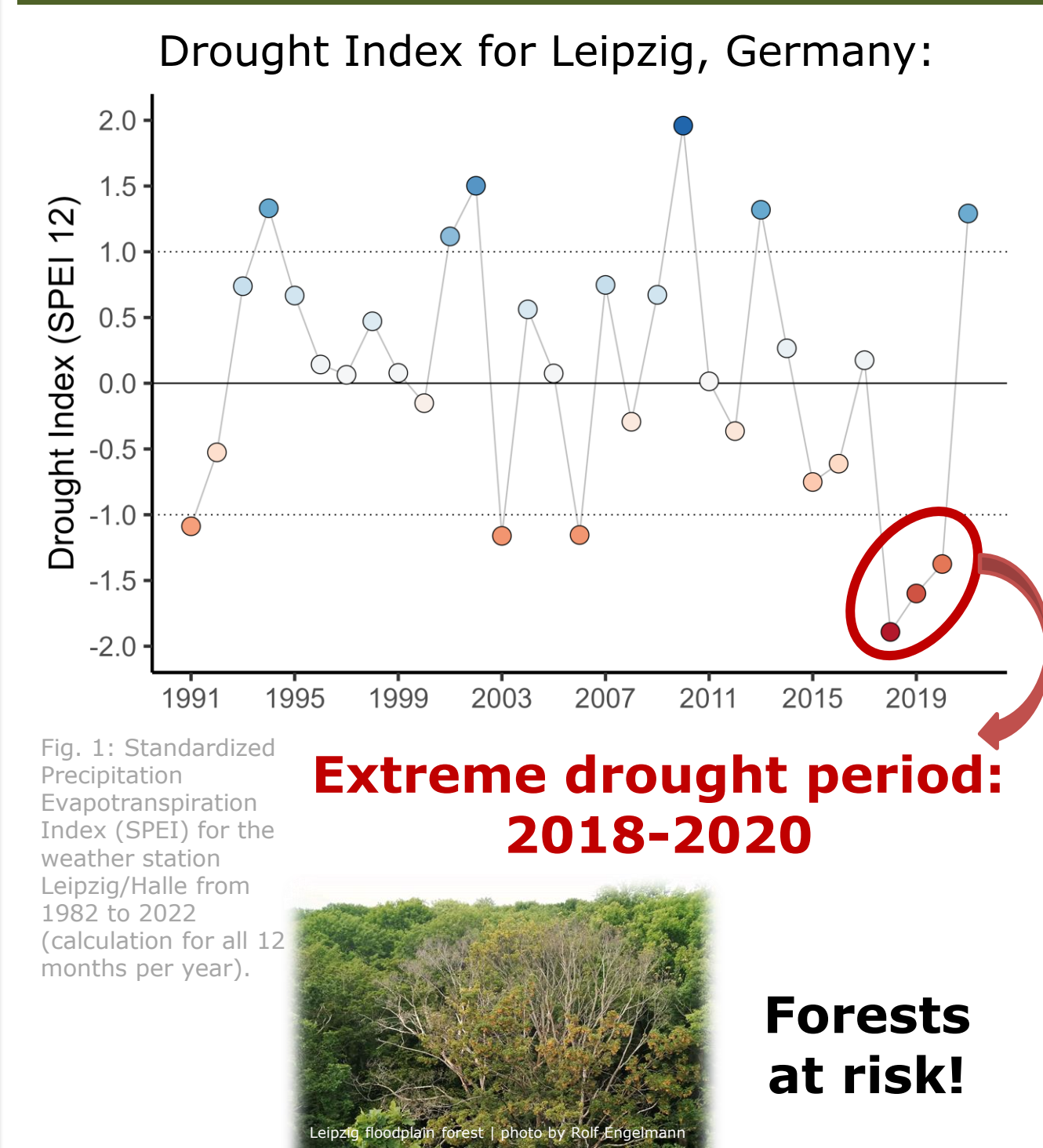


Tree Growth Responses to the 2018-2020 Drought: Roles of Drought-Tolerance Traits and Functional Dissimilarity to the Tree Neighbourhood

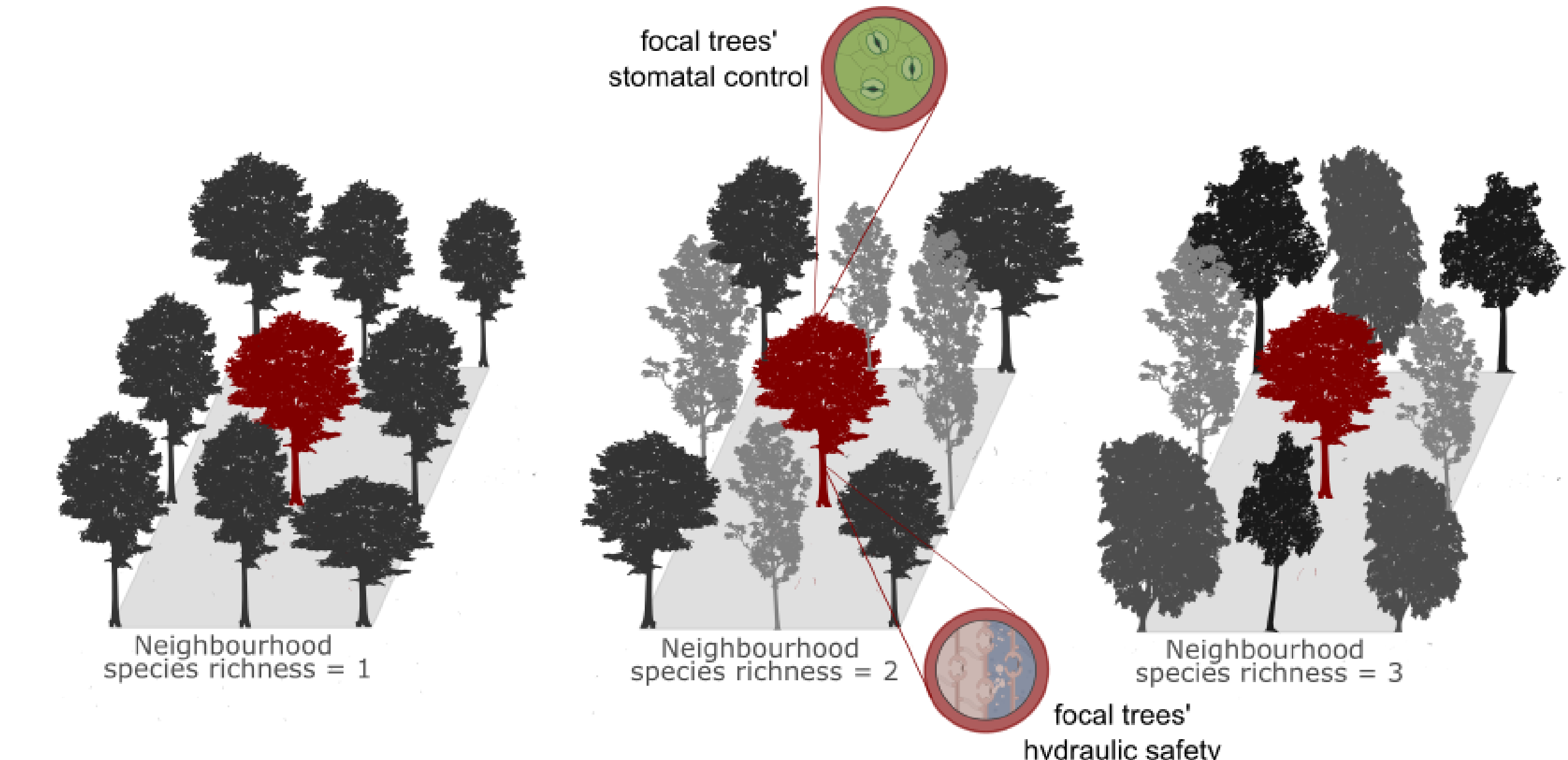
Lena Sachsenmaier^{1,2}, Florian Schnabel³, Pablo Castro Sánchez-Bermejo^{4,1}, Nico Eisenhauer^{1,5}, Olga Ferlian^{1,5}, Sylvia Haider^{6,4,1}, Ronny Richter^{1,2}, Bernhard Schuldt⁷, Fon Robinson Tezeh⁷, Christian Wirth^{1,2,8}



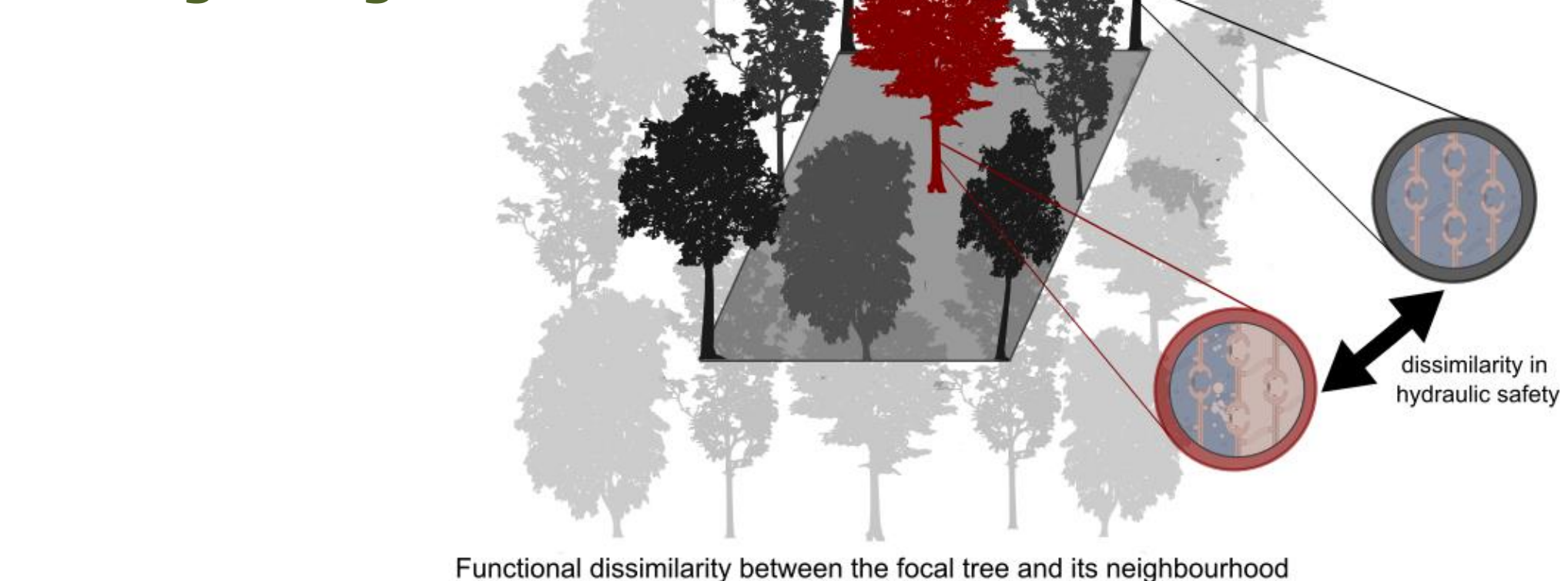
INTRODUCTION



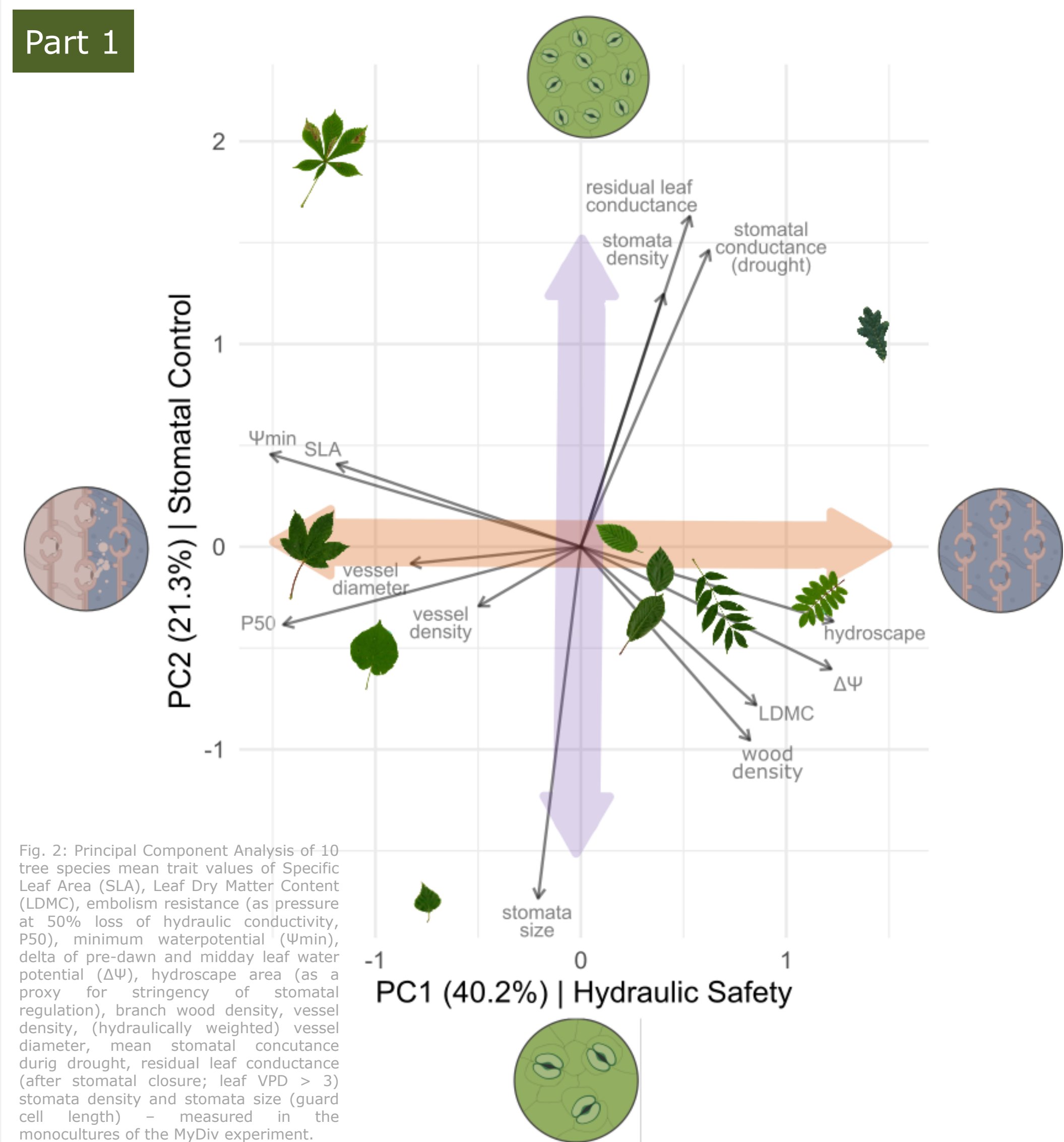
Part 1 Can certain drought-tolerance traits buffer against tree growth reductions during extreme drought? Is neighbourhood tree species richness helpful?



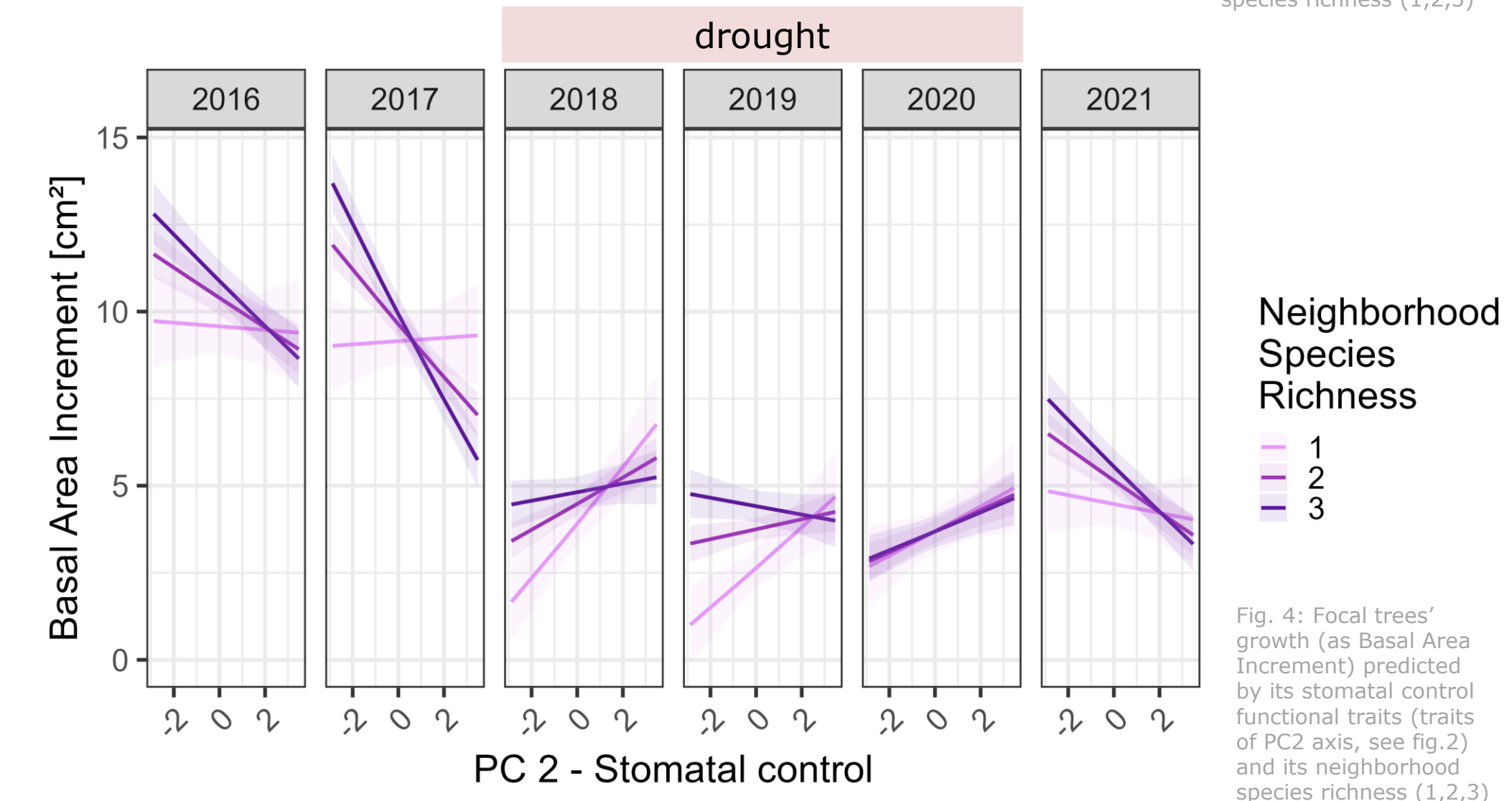
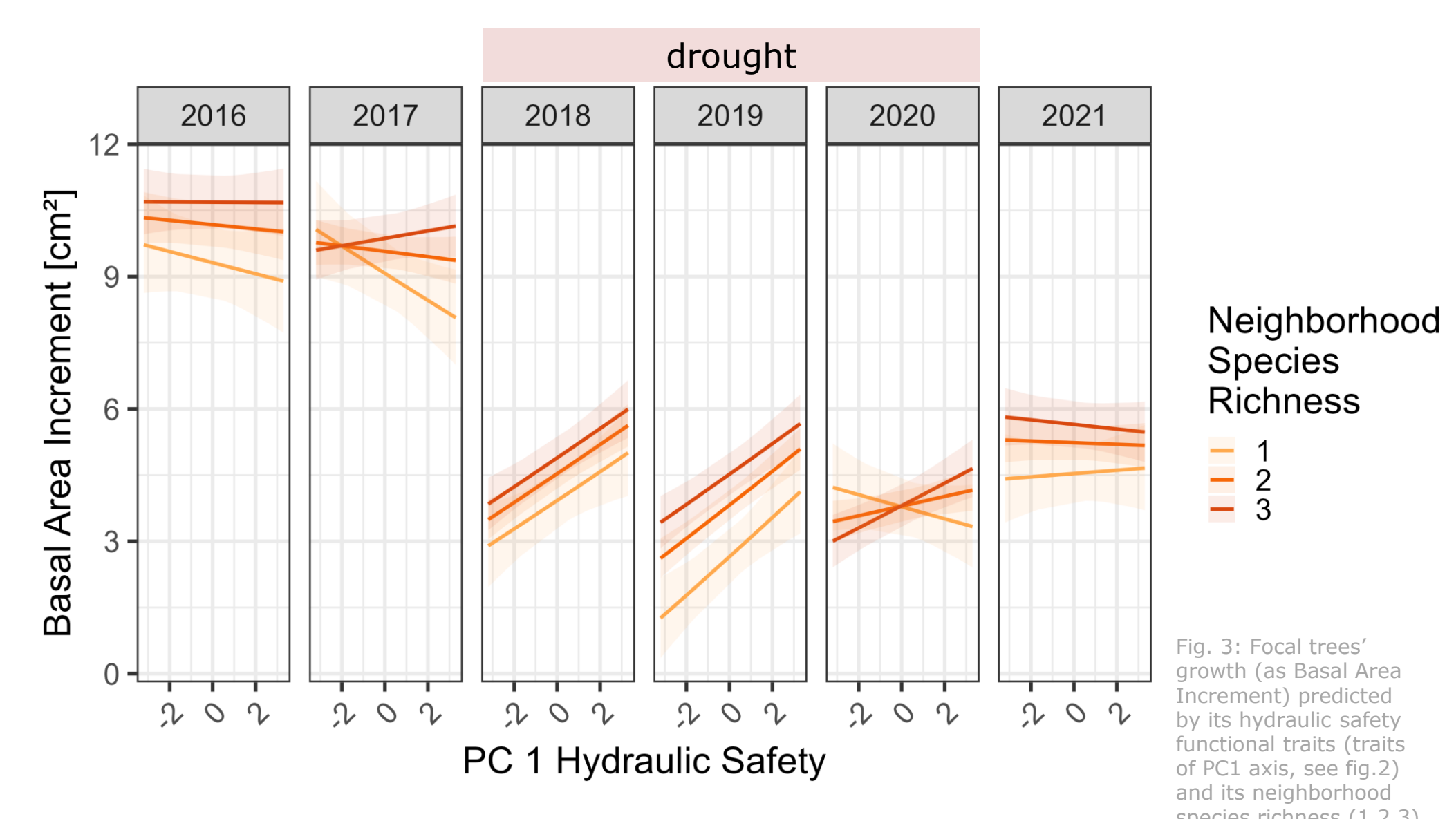
Part 2 Can functional dissimilarity between the focal tree and its neighbourhood support growth during drought?



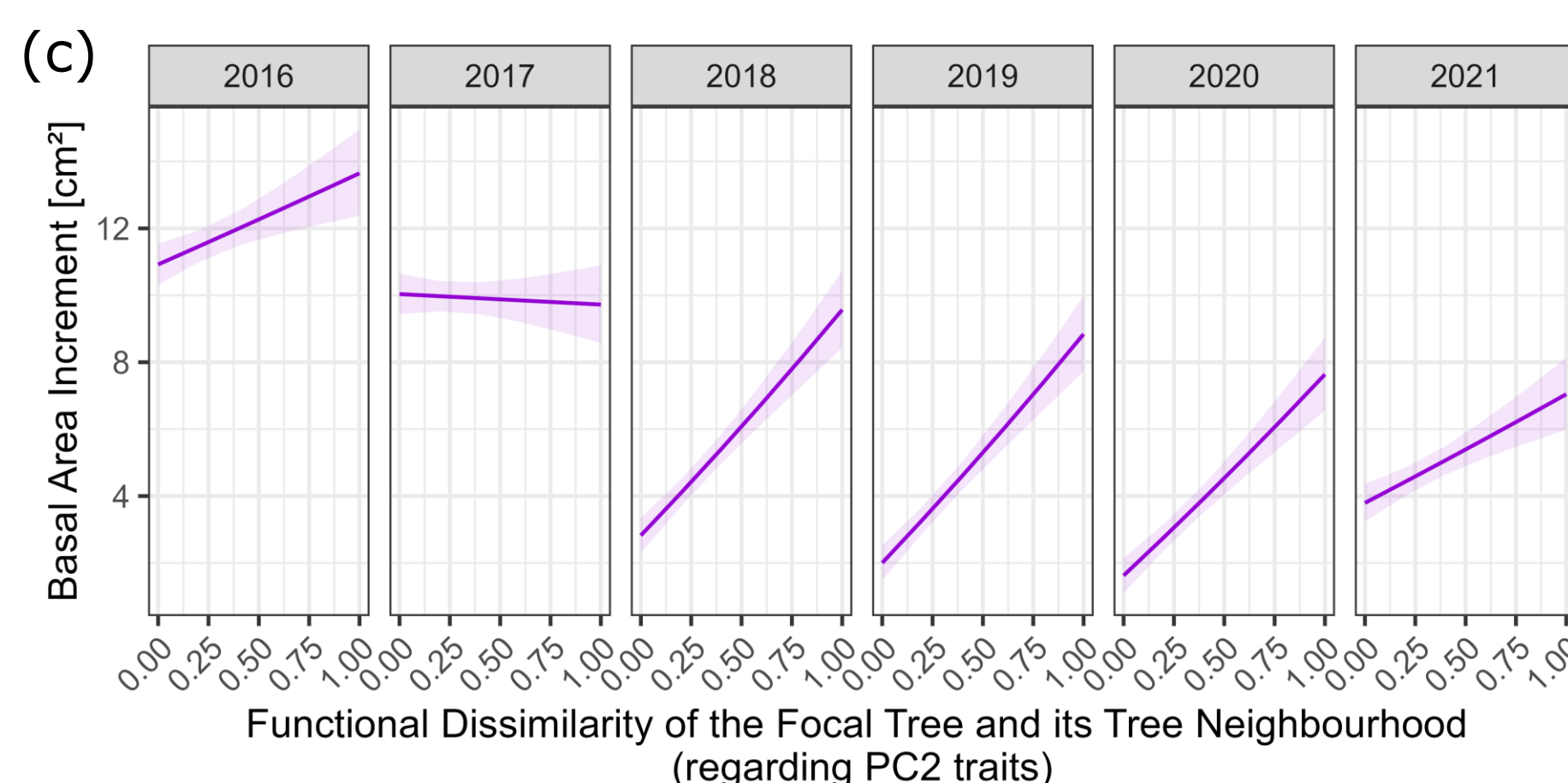
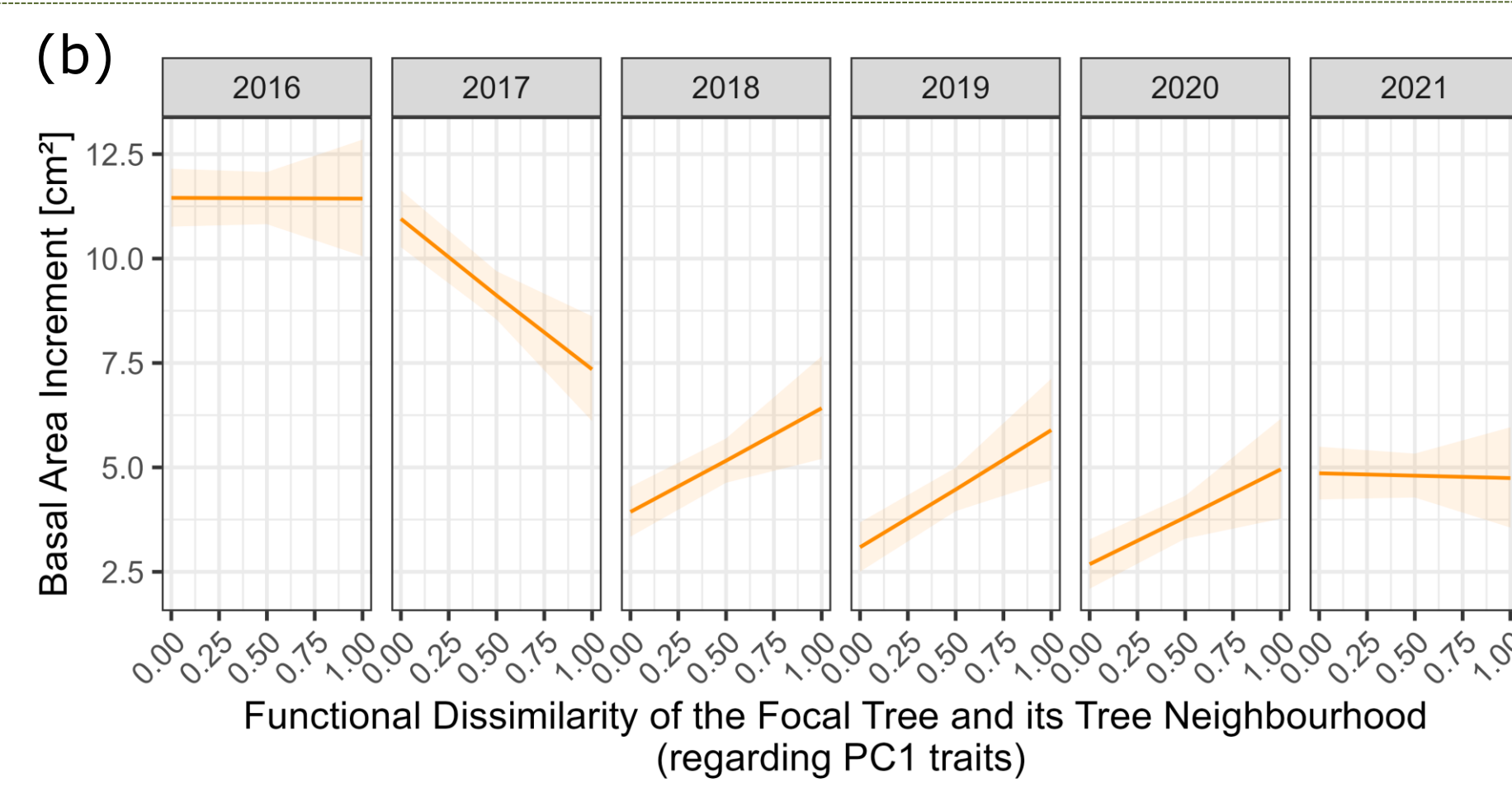
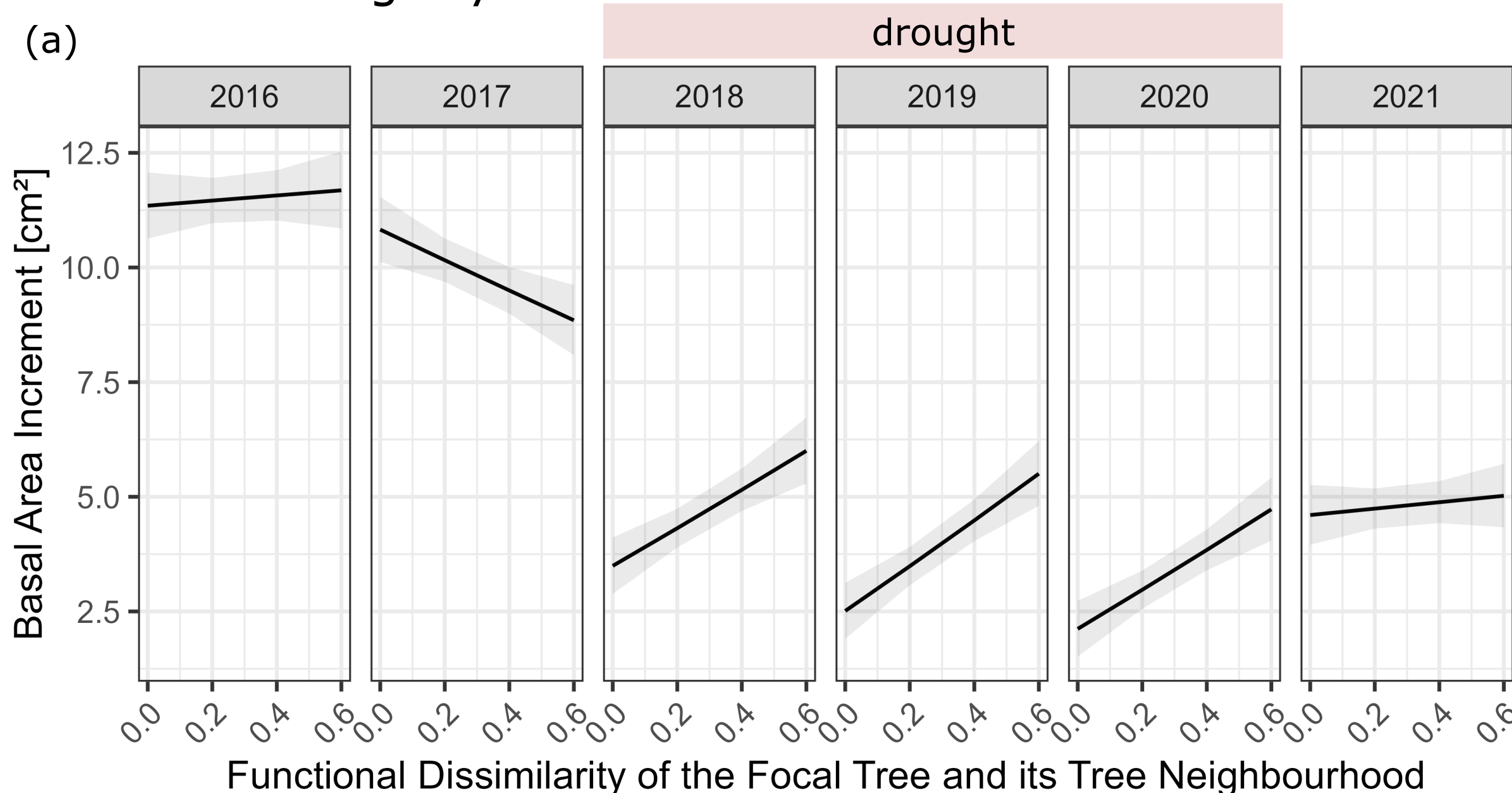
RESULTS



- Trait Syndromes related to hydraulic safety and stomatal control are clear drivers of tree growth responses
- Having a safer hydraulic system becomes beneficial for a trees' growth during drought
- Having a higher stomatal control is a disadvantage during normal conditions, but becomes even beneficial during drought
- Neighbourhood tree species richness modulates the relationship between the trees' growth and its functional identity



Part 2 A focal trees' functional dissimilarity to its neighbouring trees becomes beneficial during drought years



- Trees with distinct hydraulic safety traits compared to their neighbors grow more during drought
- Trees with stomatal control traits distinct from their neighbors show much stronger growth during drought

METHODS

- Site: tree diversity experiment in Germany (MyDiv)
- Using annual growth data (2015-2021) of 5,120 tree individuals
- measured 13 functional leaf and branch traits related to drought tolerance and resource use of 10 broad-leaved tree species in MyDiv



- Using a focal tree's functional identity (PCA scores) and the species richness of its neighbourhood...
- Using a focal tree's dissimilarity to its neighbourhood...
- ...for modeling tree growth during drought

CONCLUSION

- A trees' functional identity plays a crucial role under drought, as traits that are less advantageous in normal conditions can become beneficial during drought.
- A tree grows better under drought conditions if it is functionally more different from its neighbour trees.

