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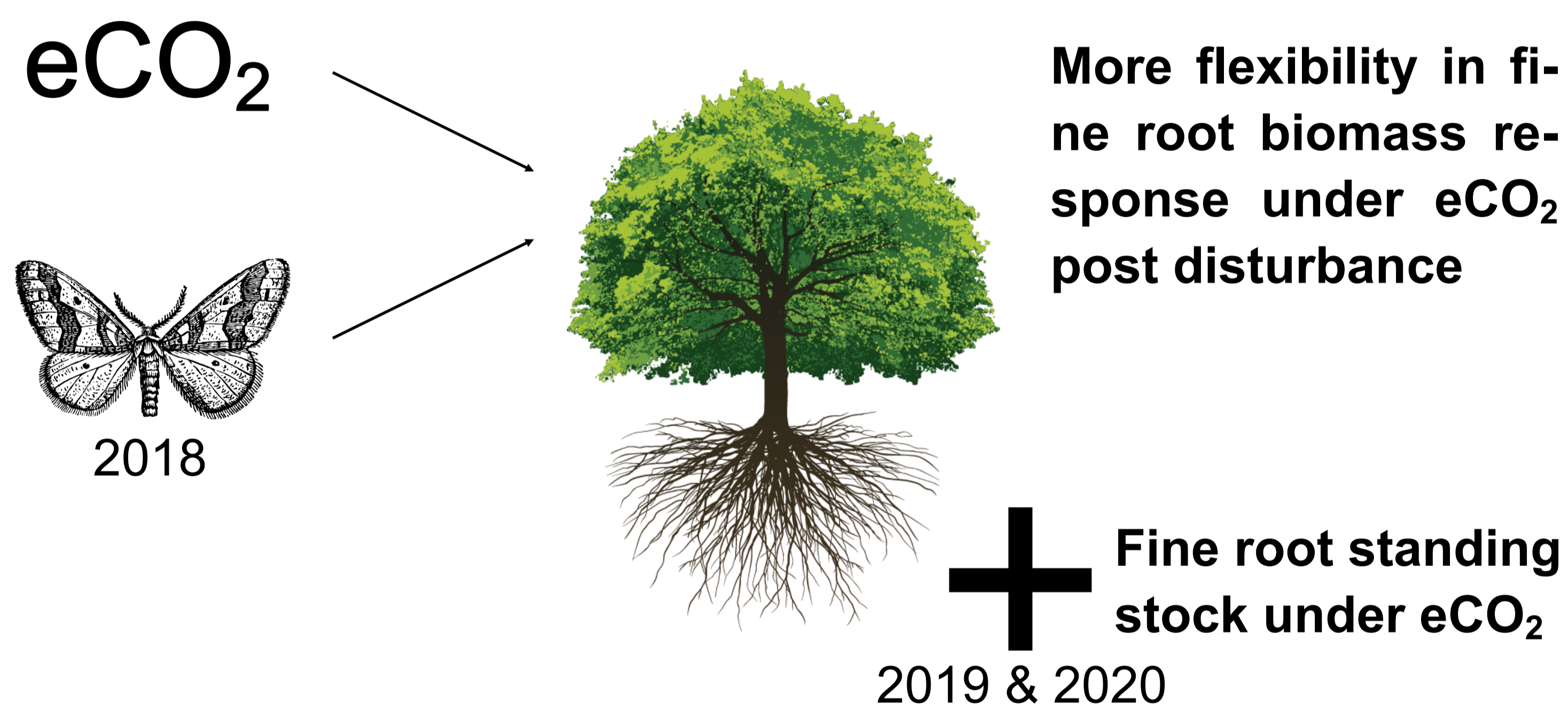
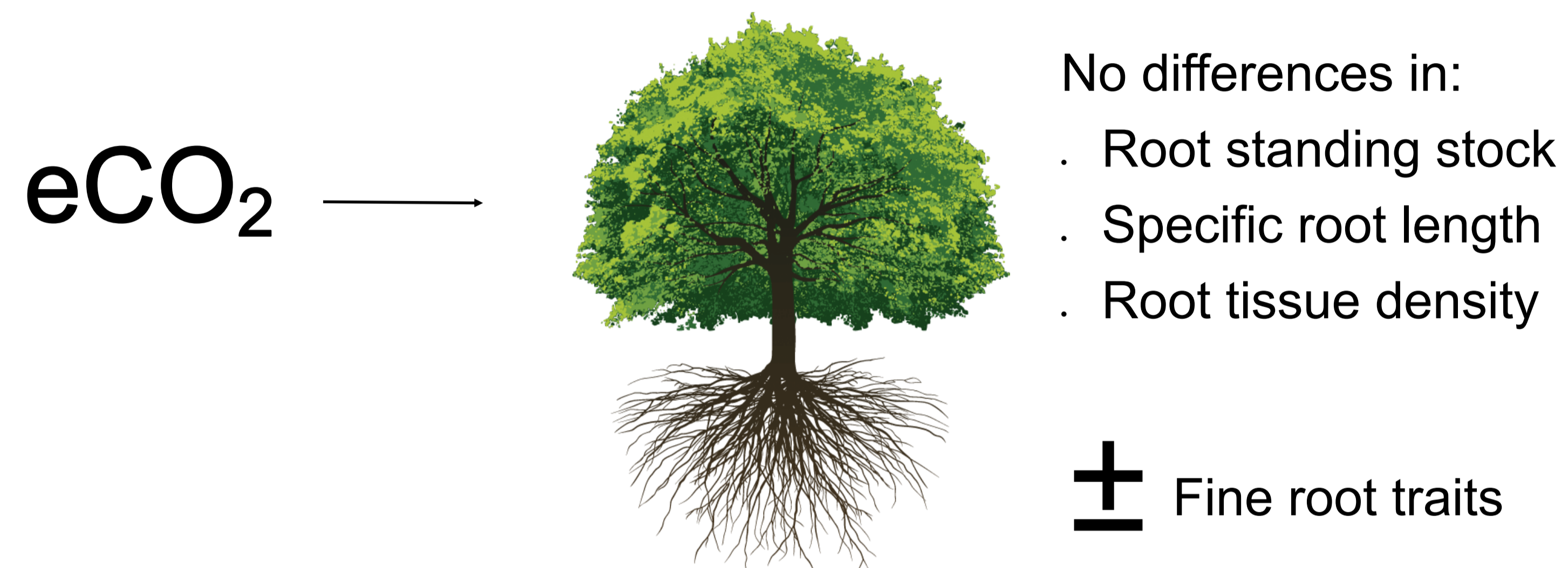


Does elevated CO₂ alter root traits after 5 years in a mature temperate woodland?

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1 MINUTE SUMMARY



INTRODUCTION

Anthropogenic CO₂ emissions have resulted in elevated CO₂ in the atmosphere and this rise is predicted to continue¹. Increases in CO₂ have fertilised forest ecosystems and led to an uptake of CO₂ into plant and soil biomass. Early findings at Birmingham's Institute of Forest Research Free - Air Carbon Dioxide facility (BIFoR FACE) showed increased photosynthetic uptake², fine root net primary productivity³ and soil respiration⁴, indicating increased carbon (C) allocation belowground. Roots play a key role in whole-plant functions, biogeochemical cycling and interaction with biotic factors, thus based on the early findings, we expect that the increased C allocation belowground will have an impact on root traits.



AFFILIATIONS
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RESULTS

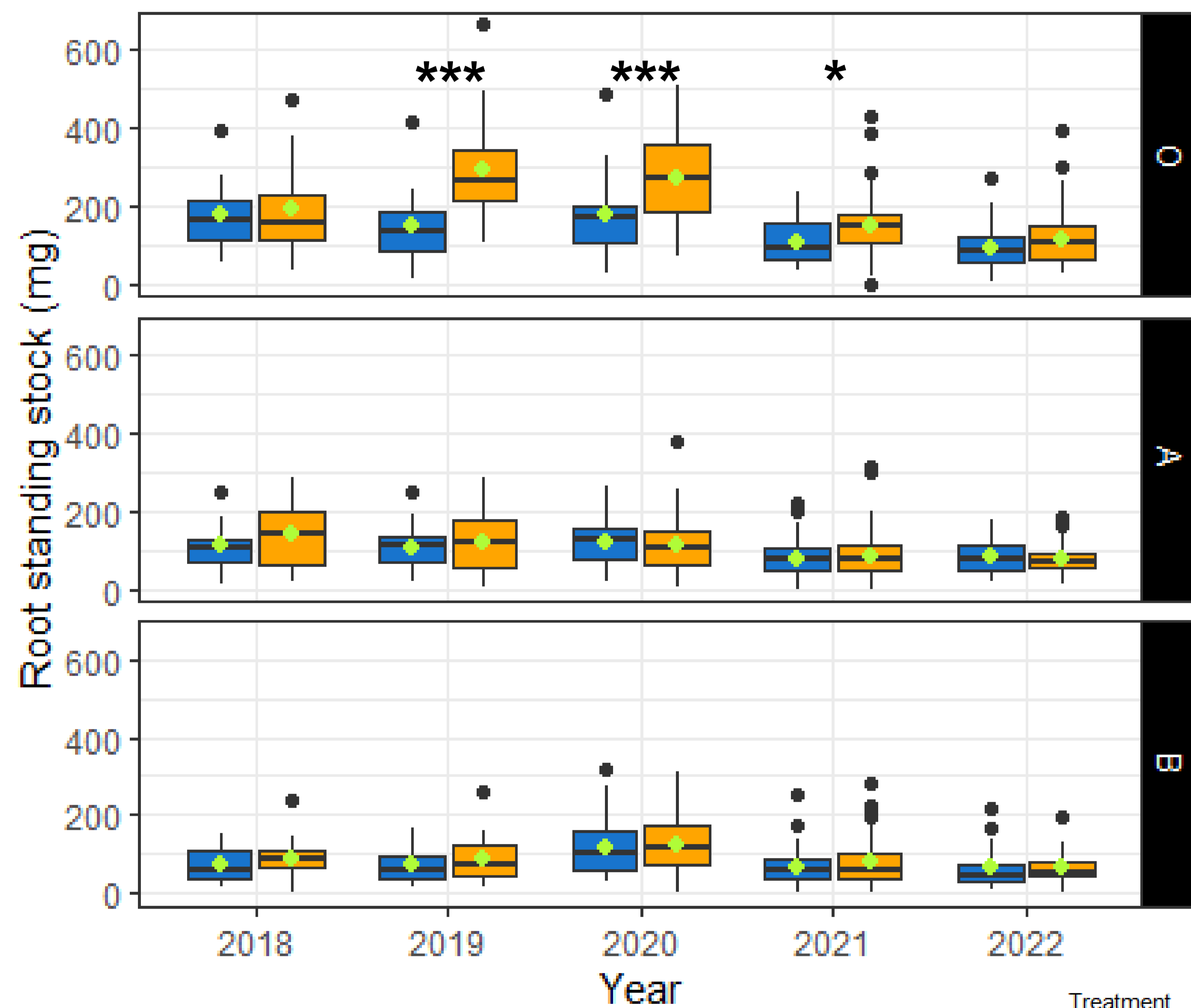


Figure A: Fine root (<1 mm) standing stock at BIFoR FACE from 2018 until 2022

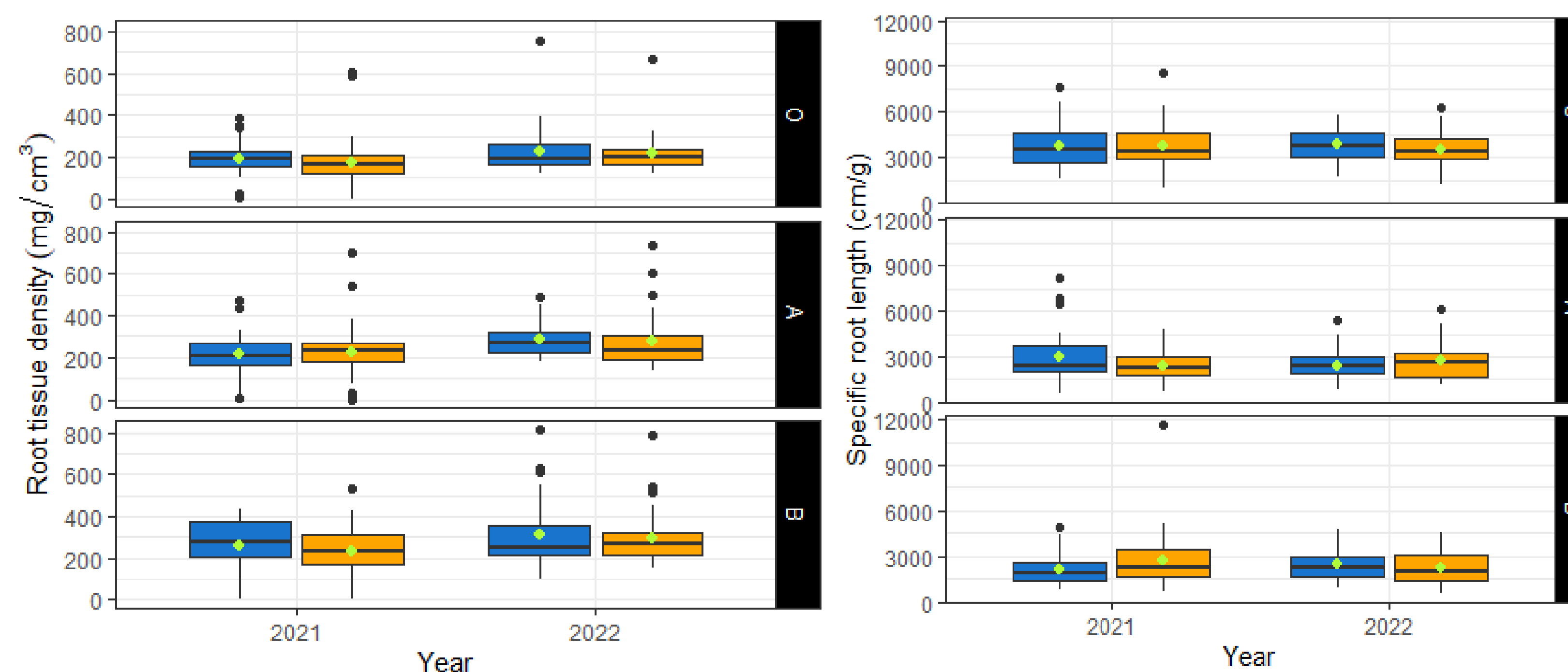
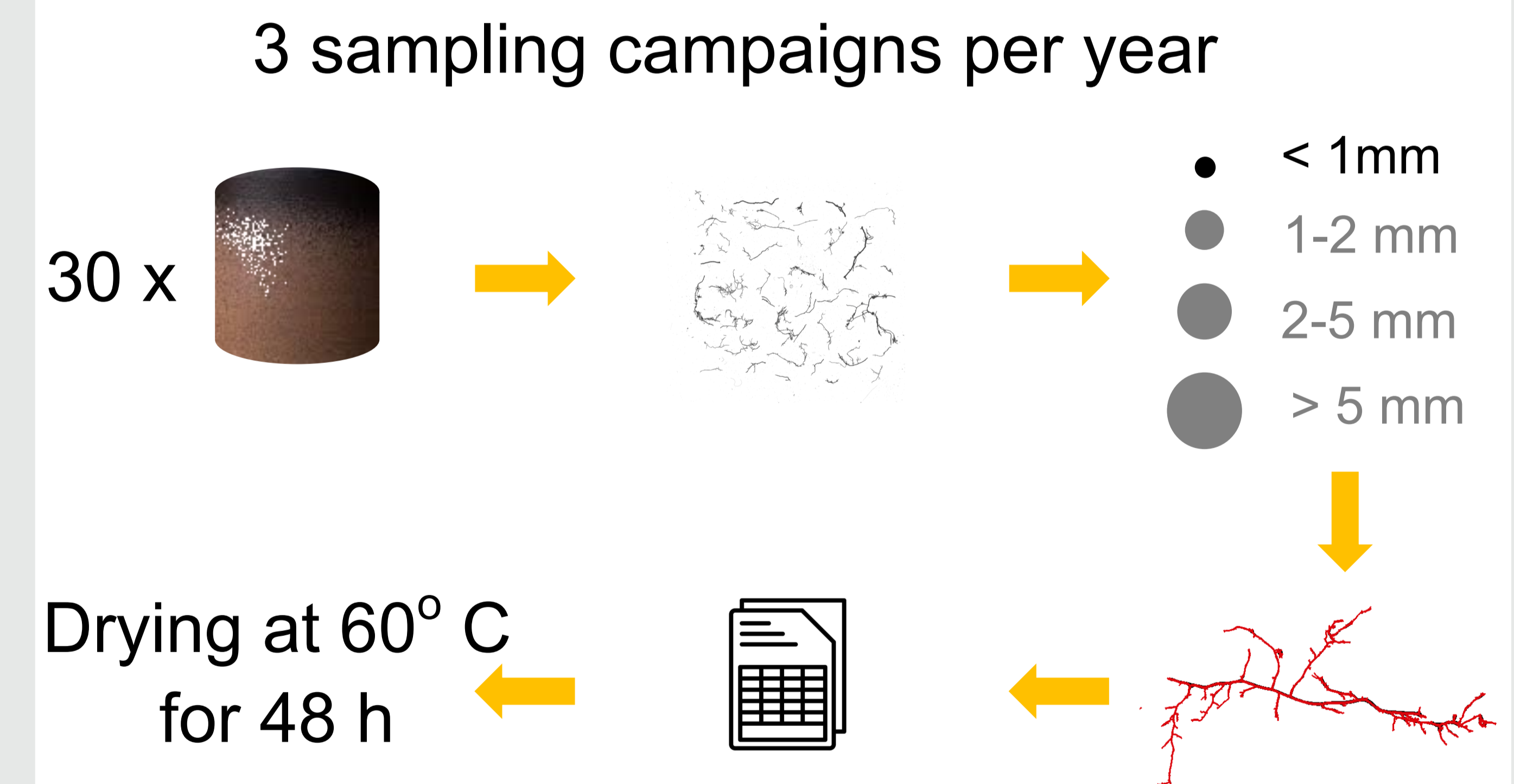


Figure B & C: Root tissue density & specific root length at BIFoR FACE for 2021 and 2022

CONCLUSIONS

- Significantly higher fine root standing stock under eCO₂, 2 consecutive years post winter moth infestation disturbance, however only in the O horizon.
- No differences in specific root length and root tissue density.

METHODOLOGY



REFERENCES

- ¹Intergovernmental Panel on Climate Change, Core Writing Team, Pachauri, R.K.; Meyer, L.A. (Eds.) Climate Change 2014: Synthesis Report, Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Intergovernmental Panel on Climate Change, Geneva, Switzerland, 2014; 151p.
²Gardner, A., Ellsworth, D., Grous, K., Pritchard, J., Mackenzie, A.R. (2021). Is photosynthetic enhancement sustained through three years of elevated CO₂ exposure in 175-year-old Quercus robur? *Tree Physiology*, 42 (1), 130-144.
³Ziegler, C., Kulawska, A., Kourmouli, A., Hamilton, L., Shi, Z., MacKenzie, A.R., Dyson, R.J., Johnston, I.G. (2022). Quantification and uncertainty of root growth stimulation by elevated CO₂ in mature temperate deciduous forest. *Science of the Total Environment*, 854.
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⁵Ratadio Team (2019).

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