Ecophysiological responses of aquatic hyphomycetes to climate change related stressors

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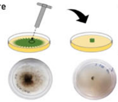
INTRODUCTION

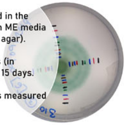
Climate change may lead to an increase in water temperature, drought events and concentration of dissolved nutrients. Aquatic hyphomycetes are the major microbial decomposers of plant litter in streams and play a key role in carbon and nutrient cycling. Therefore, it is important to ascertain how aquatic fungi cope with climate change related stressors. To understand if different aquatic hyphomycete strains have distinct physiological responses to climate change related stressors and what stressor has a greater impact on their growth, we selected 20 fungal strains (isolated from streams with different ecological state, based on their co-occurrence in streams and their phylogenetic relatedness) and measured the growth rate at different ranges of temperature, drought and nutrient enrichment.

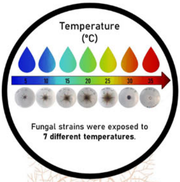
METHODS & RESULTS

20 strains from 7 fungal species were used:
- *Articulospora tetracladia* (At, 4 strains);
- *Heliscus lugdunensis* (Hl, 4 strains);
- *Heliscus submersus* (Hs, 2 strains);
- *Lunulospora curvula* (Lc, 2 strains);
- *Tricladium chaetocladium* (Tc, 2 strains);
- *Tricladium splendens* (Ts, 3 strains);
- *Varicosporium elodeae* (Ve, 3 strains).



- Mycelia plugs were placed in the centre of Petri dishes with ME media (0.5% malt extract and 2% agar).
- Exposure to the stressors (in independent trials) lasted 15 days.
- Mycelia radial growth was measured every day.

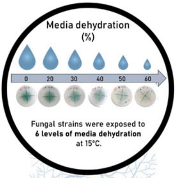




Strains optimal growth temperature was between 15 and 25°C;

Minimum temperature was defined for 3 strains at 5°C;

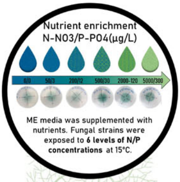
Maximum temperature ranged between 30 and 35°C.



6 strains were not affected (ANOVA $p>0.05$);

8 strains decreased growth (ANOVA $p<0.05$).

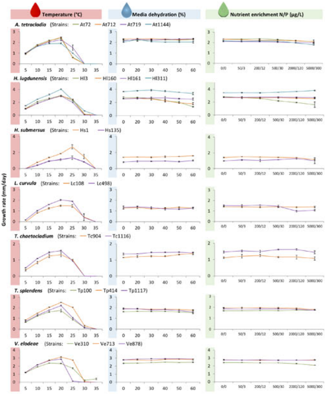
6 strains increased growth (ANOVA $p<0.05$).



7 strains were not affected (ANOVA $p>0.05$);

11 strains decreased growth (ANOVA $p<0.05$).

2 strains increased growth (ANOVA $p<0.01$).



The factors that best explained the differences in the strains radial growth were:

- Temperature, which was the stressor that most affected fungal strains (ANOVA $p<0.001$);
- Differences between the strains (ANOVA $p<0.001$). Phylogenetic relatedness did not always translate into similar responses to the stressors.

CONCLUSION & FUTURE PERSPECTIVES

- Differences in strains responses may indicate that more diverse ecosystems have the advantage of containing more equipped species for a specific stressor.

- How do these physiological results translate in the fungal decomposing activity when facing realistic climate change scenarios?
- What are the implications for other trophic levels?

ACKNOWLEDGEMENTS

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