Heat resistance in fungal mycelia
A possible adaptation to forest fire ?

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Forest fire has for a long time been the major stand replacing/modifying disturbance in boreal forests. To adapt to fire disturbance different strategies have evolved. This study focuses on the organism group of wood fungi, and one of several possibilities for adaptation to forest fire - increased heat resistance in the mycelia. 16 species of wood fungi were tested at 100, 140 180 and 220 °C at 5, 10, 15, 20 and 25 min. Resembeling different possible conditions in a log during forest fire. Species associated with fire affected substrates had a much higher survival rate over all combinations of time and temperature compared to species with a more general ecology (fig. 1.). Another study was also made to control if heat has an effect on inter specific competition. Three fire associated species was tested against three non associated species. The species was inoculated on pine discs and treated with heat. After two weeks the discs were scanned for detection of the interaction zone (fig. 2 and 3). In all replicates the fire adapted species had conquered a larger area.

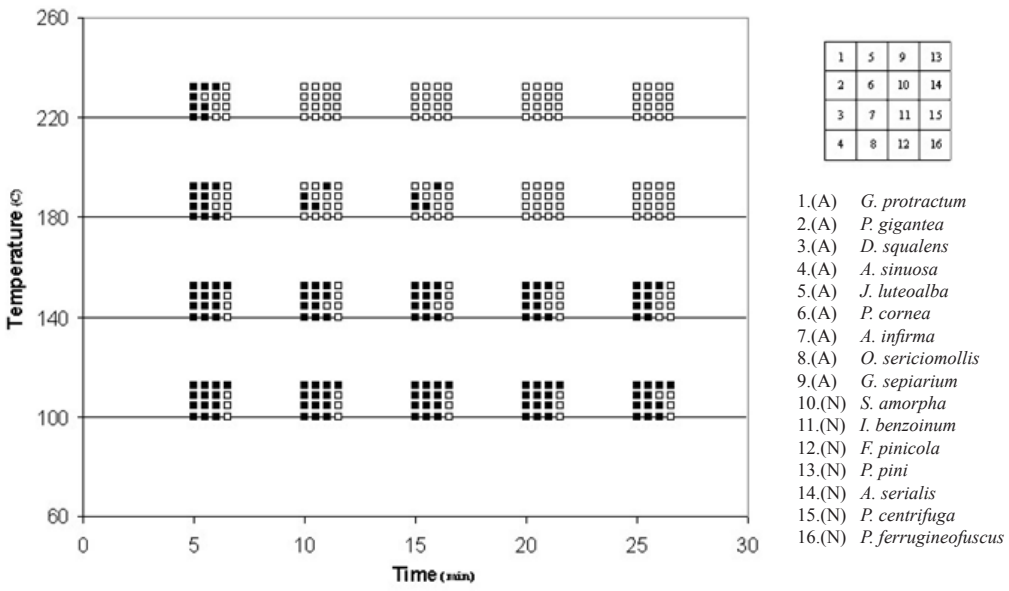

Figure 1. Survival at 100, 140, 180 and 220 °C after 5, 10 15, 20 and 25 min. of treatment for 16 different species of wood decaying basidiomycetes. Black squares indicate re-growth in all three replicates. after temperature/time treatment and white square indicates, no re-growth in any of the replicates. (A) denotes fire-adapted species and (N) denotes species with no adaptation to fire.

Figure 3. Wood disc inoculated with fungi and treated with heat. 100 °C for 25 min. The disc on the right is a unntreated control. The upper fungi is *P. gigantea* (fire associated species) and the lower is *F. pinicola* (non fire associated species).

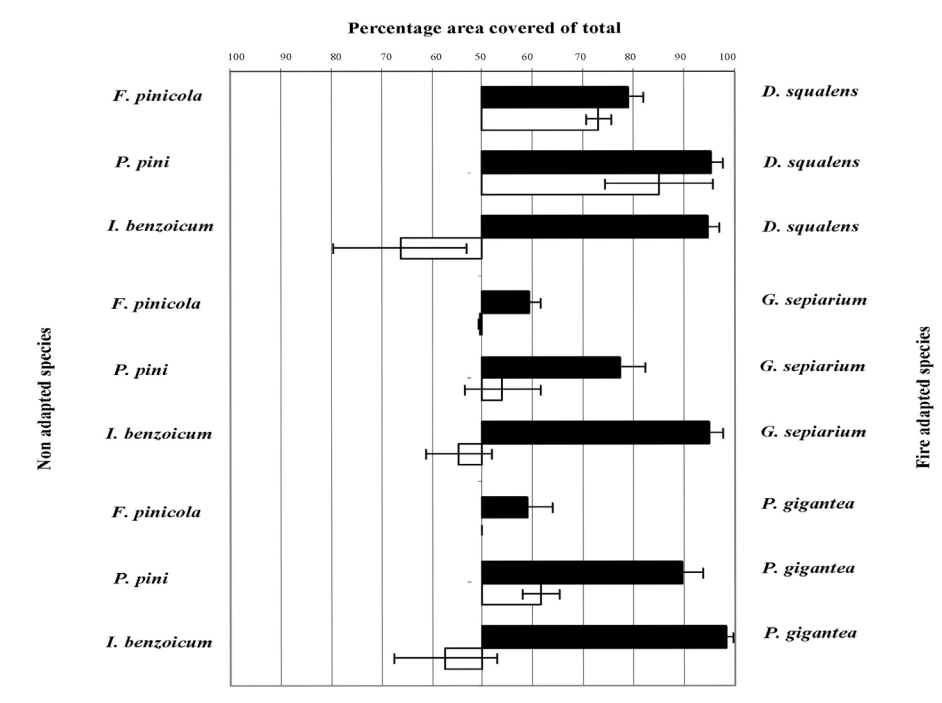

Figure 2. Interspecific competition between species adapted and not adapted to forest fire. Species on the right side are adapted (commonly found after forest fire). Black bars show percentage of the total wood disc area inhabited two weeks after treatment with heat (100 °C for 25 min) and white bars shows un-treated controls.

Conclusion

Temperature tolerance seems to be a factor potentially subject to selection because species confined to open stands regularly exposed to fire have higher tolerance to heat. This suggests that some species are more affected by a fire than others. Thus, in addition to killing some species the competitive balance in fire affected logs may change.

Restoration fires are increasingly used in biodiversity management in boreal Fennoscandia. The current study can be used for prioritizing areas for restoration fire. If we can assume that many fungal species actually survive the fire event it allows restoration fires to be performed at sites with higher abundance of dead wood and associated wood fungi, this will to further extent be applicable on areas where dead wood content in the early decay classes is dominant. This is due to the higher risk of total consumption in the later decay classes.

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