The influence of drought on litter decomposition in semi-natural heathlands

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HOW WILL PREDICTED PERIODIC DROUGHT AFFECT SOIL CARBON STORAGE?

Decomposition of organic litter is an essential source of carbon efflux from terrestrial ecosystems into the atmosphere.

Precipitation and soil moisture content are primary controls for rate of respiration, and the predicted changes in rainfall patterns and the occurrence of periodic drought, due to climate change, could greatly alter this ecosystem function.

Through the use of a modified tea bag methodology we have investigated decomposition of organic matter in soil and litter along a combined drought and post-burn successional gradient in Atlantic heathland communities in western Norway.

MEASURING SOIL DECOMPOSITION USING TEA BAGS

Over 500 tea bags of either green tea (**labile material**) or rooibos tea (**recalcitrant material**) were incubated both below and above ground and retrieved in three month intervals expanding over 12 months total. Dry tea bags were weighed before and after incubation to asses breakdown of tea content. Ingrowth of roots from soil were removed beforehand.

RESULTS

- **The decomposition of both labile and recalcitrant materials belowground decrease under reduced precipitation in the older stages.**
- **Labile material has a higher average loss of mass compared to the recalcitrant material.**
- **Amount of aboveground decomposition is lower under extreme drought.**

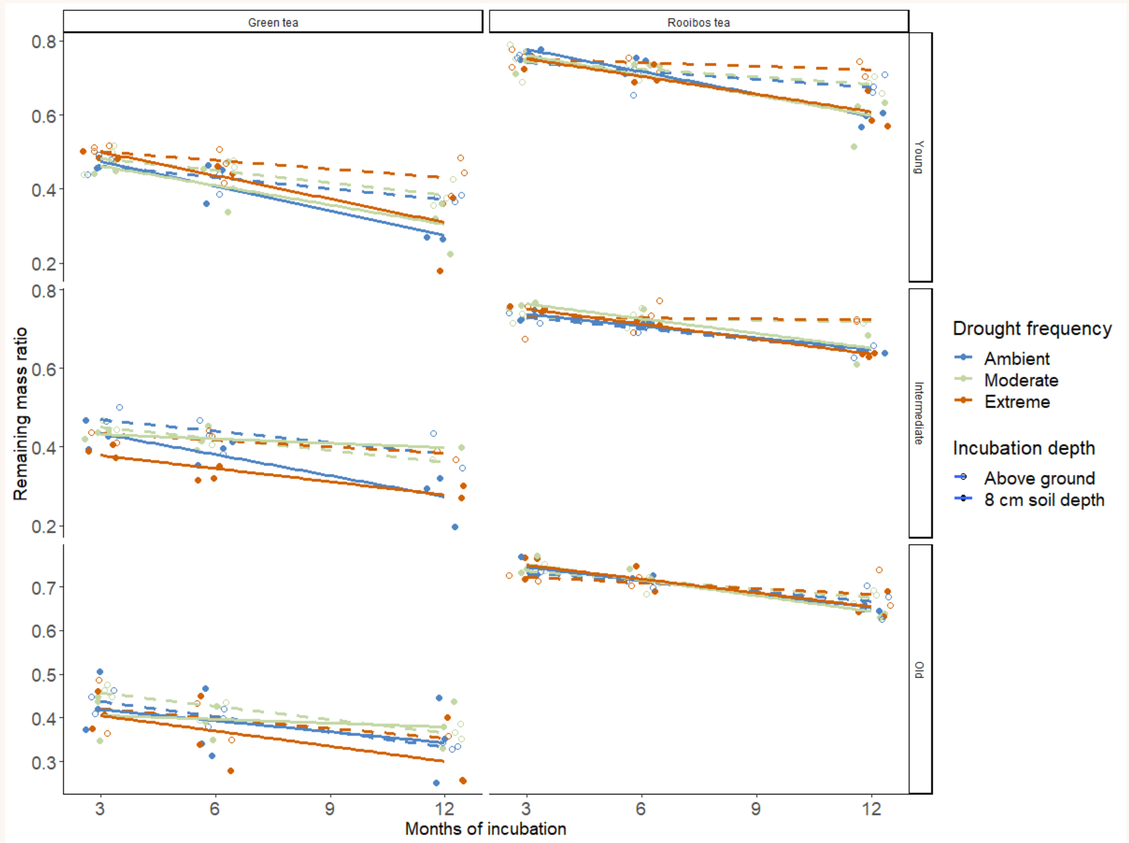

FIGURE 1: Ratio of mass remaining after incubation of ***green tea*** and ***rooibos tea*** above and below ground in three successional stages after burning. All bags were incubated October 2018 and retrieved either 3, 6, 9 or 12 months later. $p < 0.01$.

DO OTHER ECOSYYSTEM INTERACTIONS INFLUENCE THE EFFECT OF DROUGHT?

The general pattern of increased decomposition observed belowground under extreme drought frequency in the older successional stages indicates that vegetational diversity and amount of coverage affects how soil respiration responds to drought.

Soil nutrient availability is likely to vary along the successional gradient and could reflect variation in microbe community, although our study did not find any significant trends between the successional stages and types of material.

Other studies using the same methodology have shown that extreme drought can alter the soil microbe community, which influence soil fertility, structure and climate regulation. Such changes could enhance alterations between interacting ecosystem functions both below and aboveground. To understand how the terrestrial carbon cycle will be affected by extreme weather events we need to further investigate these interactions.

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