Deciphering the effect of mixed *Sphagnum rubellum – Molinia caerulea* on litter decomposition through the 3D fluorescence analysis of Water Extractable Organic Matter.

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Sphagnum peatlands are experiencing varying perturbations, which jeopardize their ability to store vast amount of carbon. Vegetation change driven by changes in temperature and hydrology as a result of potential/predicted climate change. Vascular plant percentage covers are expected to increase. This will lead to changes in the relative proportion of litters reaching the soil (increase of vascular plant litter). Thus, it implies possible litter mixture effect that did not exist before. The global aim of this study was to study specific interactions between *Sphagnum rubellum* (a peat forming moss) and a vascular plant which tends to colonise many *Sphagnum* peatlands, *Molinia caerulea*. Field and laboratory studies have shown that mixing litters of *Sphagnum rubellum* and *Molinia caerulea* has a significant synergistic effect on the decomposition of organic matter (assessed by measuring litter mass loss with time). It is not always easy to explain what factors are involved in this effect. The specific aim of this study was to investigate the pertinence of analysing the fluorescence characteristics of Water Extractable Organic Matter (WEOM) extracted from *Sphagnum rubellum and Molinia caerulea* litters incubated in monoculture and in mixture with PARAFAC to explain such an effect. A primary analysis of the 3 main fluorophores showed that compared to the *Sphagnum* litter, the gamma fluorophore tended to increase with incubation time. This was first interpreted as an increase of products originating from cell microbial lysis. The gamma fluorophores intensity in the WEOM from the measured mixed litters was lower than the intensity calculated from the litter in monoculture (additive effect). This suggests that microbial biomass in *Molinia caerulea* litter, in the experiment conditions, experiences lethal conditions. Mixing with *Sphagnum rubellum* litter prevented this lethal effect. It is proposed that the *Sphagnum rubellum* litter maintain moisture conditions favourable to decomposition of *Molinia caerulea* litter. Here we present further discussion of these results from the PARAFAC analysis of the dataset.