Reviewer 1:

I remain with a minor comment:
Though I understand that figure layouts are a design choice, I am a bit at odds with the figure ratios in Fig. 2 and 3, which now both show the same plot types, y-axes and the same range of values. However, concerning the use of space, the y-axes are very squeezed in Fig. 2 while they are very strechted in Fig. 3 (around five times higher), for which do not see a reason.
With more similar y-axis heights, both figures could even be shown as one combined figure consisting of a) and b). - As additional benefit, this would be in line with reviewer 2's recommendation to reduce figures.

That is a good observation, however even if the Y-axis of both figures represent the same range of values the data set shown in them is not the same.

Figure 2 is a composite figure of 12 different panels each with its own y axis. The axis seems contracted because 6 of those panels are fitted vertically in one figure.

Figure 3 is only one panel and for that reason the Y axis seems expanded. To make figure 3 axis more similar to figure 2 then we would need to reduce figure 3 size to a point it won't look good.. Or figure 2 would need to be enhanced so much that it would not fit a page.

It would be possible to decrease the number of panels in figure 2 of course. For example, including all 3 meshbag amendments in one panel instead of 3 but this will make the panel more crowded and difficult to distinguish what is important in the figure: the differences between months. For that reason, this dataset configuration was decided.

Therefore, I must respectfully insist on keeping the current figure configuration.

However, I must admit that in the last manuscript version the figure 2 was not large enough and the difference between axis was more evident. In the newest version I have enlarged figure 2 and it does not look that weird anymore.

Reviewer 2:

EMF might have competitive advantage over saprotrophs in the bags since the bags contain less C resources than the bulk soil but that was not the main objective of the experiment

- So, mention Gadgil Effect briefly.

Reply: The Gadgil effect is defined as the suppression of the **soil organic matter decomposition rates** caused by EMF outcompeting saprotrophic fungi (Fernandez and

Kennedy, 2015 in: Revisiting the 'Gadgil effect': do interguild fungal interactions control carbon cycling in forest soils?).

We did not measure decomposition rates in the meshbags. As mentioned before, there could have been competitive advantage of EMF over saprotrophs inside the bags due to the lack of organic matter in the bags. However, that is not related to **organic matter decomposition suppression by EMF.** Therefore, there is no place to mention the Gadgil effect unfortunately.

Growth. The point is of this paragraph is to discuss growth (increase in biomass through time). Measuring growth rates of free-living fungi can be done in the lab but EMF need the host to grow.

- Clarify in text, other readers may be confused too.

Reply: That is precisely mentioned in the paragraph:

Growth rates of free-living fungi from natural soils has been studied in laboratory by measuring labeled acetate incorporated in the fungal membrane component ergosterol Quantifying growth (production) of EMF natural communities on the other hand is more complicated since EMF are dependent on plant roots (Smith and Read, 2008) and such measurements must be performed when the fungi is living in symbiosis.

Either of these assumptions (first order or zero order kinetic for hyphae) has its own amount of inexactness, being both approximations, but the latter seems more correct and a more realistic model.

- Explain this in the text.

Reply: Added explanation in the material and methods where the details of the model are explained.

These values exceed the N critical loads in which negative changes in the function and composition of an ecosystem are expected (Kuylenstierna et al., 1998; Pardo et al., 2011; Pihl Karlsson et al., 2017).

- Write this in the ms.

Reply: Done.

Availability of P can be very low in soil. To make sure we get enough available P for the trees to get a growth effect if P is limiting, an excess of P was added.

- Clarify in text.

Reply: Done in the material and methods.

It is the size used to exclude fine roots but allow mycelium hyphae colonization. This information is given in the original paper that describes meshbags (Wallander et al., 2001) That reference is provided in the methods.

- Explain this in text or a methods supplement, so readers don't have to look up a 2001 paper.

Reply: Explained in the methods.

The amount of apatite we used is similar to amount the Rosenstock et al. (2016). We chose that amount to give enough mineral to the fungi to sustain growth for the whole duration of the experiment. We gave more apatite than urea since apatite is a more recalcitrant source and has less % of P (18) in comparison with the % of N (42%) that the methylene urea has. The apatite size was chosen based on other studies showing that the finer the grain size the highest the EMF respiration colonizing the mineral (Leake et al., 2008). 50 um is small enough for the material not to pass through the bags´ mesh. 250 mg was the smaller sieve size we had to give a higher threshold for the crushed mineral.

- Clarify in text or a methods supplement.

Reply: Added in the text.

150 days was the duration of our experiment which contained the productive period for EMF growth. 28 days is discussed as the mean residence time of the biomass in Ekblad et al. 2016. We rounded up to 30. The rest is because we wanted to have as many overlapping incubation periods as possible for the model to have enough data points. A bag incubated for 150 days overlaps with five bags incubated for 30 days. A bag incubated for 120 days overlaps with four bags incubated for 30 days and so on.

- Clarify in text or a methods supplement.

Reply: Added a couple of sentences in the materials and methods where I mention the experimental setup.

Yes, it can be a disturbance and it is specified as a weakness of the experimental design and acknowledged in the discussion.

- Be explicit, write 'disturbance' in the ms.

Reply: Done. Added that there could be a disturbance of the mycelial connections when collecting the bags.

Up to 10 hours in summer and 8 in winter that is roughly the amount of day light hours when the sampling was done.

- Clarify in text or a methods supplement.

Reply: Added in the materials and methods.

We used ergosterol as an estimation of living fungal biomass. Ergosterol has been used to estimate living biomass in many studies. Chitin is more recalcitrant source and was used to enable estimation of the necromass in Ekblad et al. (2016). It would have been ideal to use both, but we did not have developed that protocol in our lab. Nucleic acids would not be a good option. To identify fungal DNA amplicon sequencing would be necessary. This technique is based on relative abundances and is semiquantitative. Therefore, it won't be useful to quantify total biomass as we did in this paper.

- Clarify in text or a methods supplement.

Reply: Added a couple of sentences in the materials and methods where I mention that ergosterol was used.

According to the climate data the average temp. that year was not different from other years. Peaked in July and decrease in autumn. The July and September average temps. were very similar

among the years 2013,14,15,16. For the precipitation 2014 had more precipitation in July (and in general) than 2013, 2015 and 2016. There were some differences in the precipitation patterns among years but nothing very clear to help us understand the seasonal effect seen in our data. Moreover, sampling meshbags more years than 2015 would have been necessary to understand the potential effects of climatic variation between years on EMF growth.

- Mention in text or a results supplement.

Reply:

Added in the discussion when we discuss the seasonal patterns observed.

It is not redundant. The two-months in this case do not come from the sum of 2 one-month bags. They are bags that have been incubated for two months. So both incubation times (bags incubated for one month and bags incubated for two months) confirm the high biomass early in the season.

- Clarify in the text or figure legend.

Reply: Now the figure legend is more specific:

Figure 2: Standing EMF biomass in the ***meshbags that have been in the soil for a period of 2 months a) and a period of 1 month b****). The error bars represent the standard error of the mean (n=3).Lowercase letters represents statistically significant (P<0.05) differences between the incubation periods according to Dunn´s test.*

This is a very good observation. Yes, there it is carbon in the urea meshbags. However, the methylene urea contains only 2 carbons. Only few organisms (methylotrophs bacteria) can use it as the sole source of C and N. It is unlike than fungi could have used it as both N and C sources.

- Mention this in text or a results supplement.

Reply:

UPTDATE: Recently I found out that there are methylotrophic yeasts and they can be present in soils. So it is possible that the use of methylene urea as a carbon source is not restricted to bacteria.

Therefore, in the discussion section where I already acknowledge the potential presence of non-mycorrhizal fungi in the meshbags, I have added a sentence about these yeasts:

Therefore, we cannot rule out the possibility that part of the ergosterol measured in the bags came from non-mycorrhizal fungi ***(ie: methylotrophic yeasts in the urea-amended bags that can use methylene urea as both C and N sources).*** *Even so, the significant negative effect of P fertilization on all the meshbag types suggests…..*

line 112. 'it has been suggested that anthropogenic N deposition can potentially change the forests nutrient requirements and push the system toward phosphorus (P) limitation' - but see Scientific Reports 7, 7856 (2017), Science 376, eabh3767 (2022).

Reply: Good point. There seems to be some evidence about N decreasing in soils in north America (Reports 7, 7856, 2017) and about N depositions peaks decreasing and stabilizing in Europe (Science 376, eabh3767, 2022). However, there are also some other studies

suggesting that northern forests ecosystems (thought to be N-limited) are showing signs of P limitation. Therefore, I have made it more specific in this part of the intro:

*However, **there is some evidence suggesting** that anthropogenic N deposition can potentially change the forests nutrient requirements and push the system toward phosphorus (P) limitation (Almeida et al., 2019; Jonard et al., 2015; **Talkner et al. 2015; Prietzel et al. 2020 ; Du et al ., 2021)***