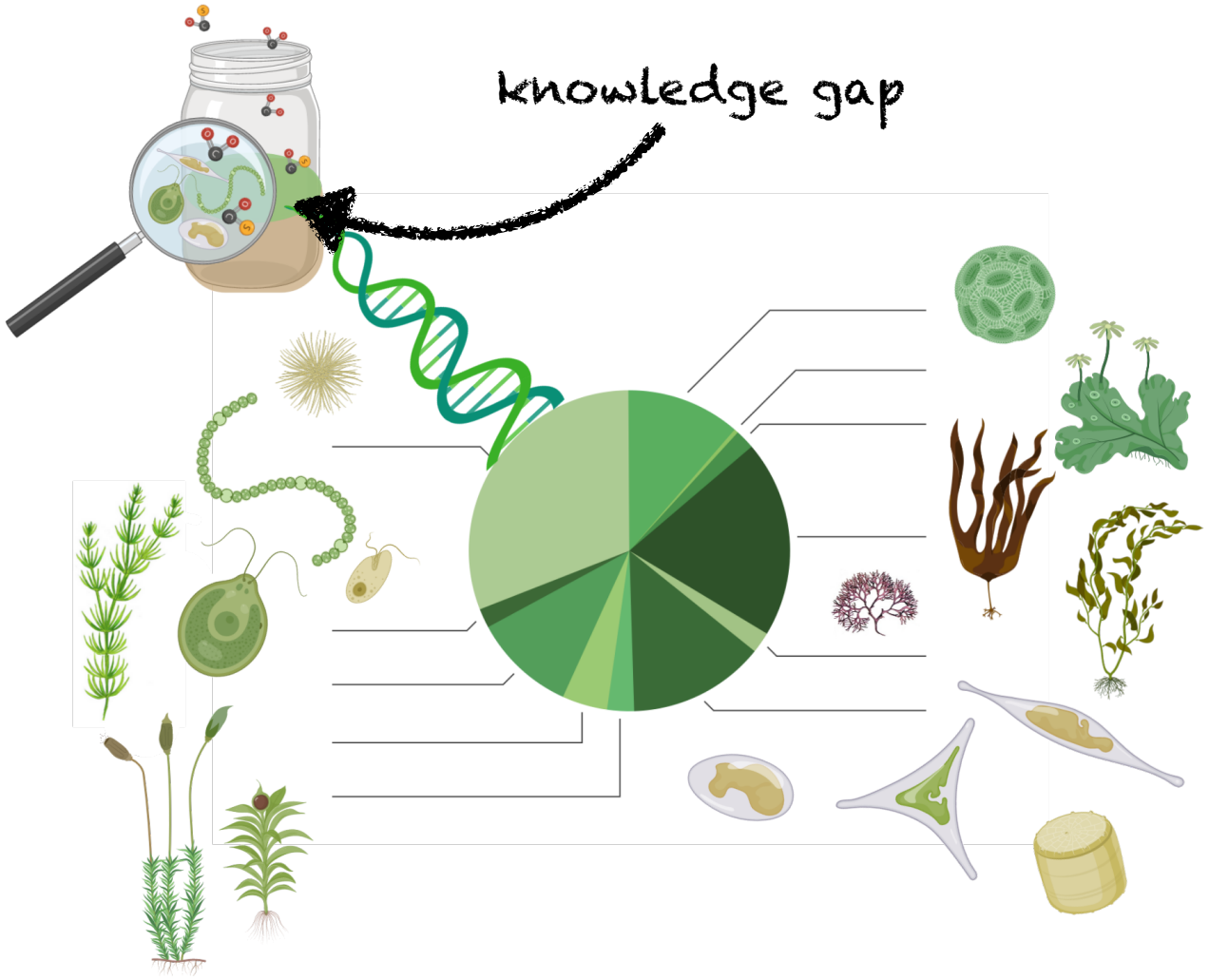
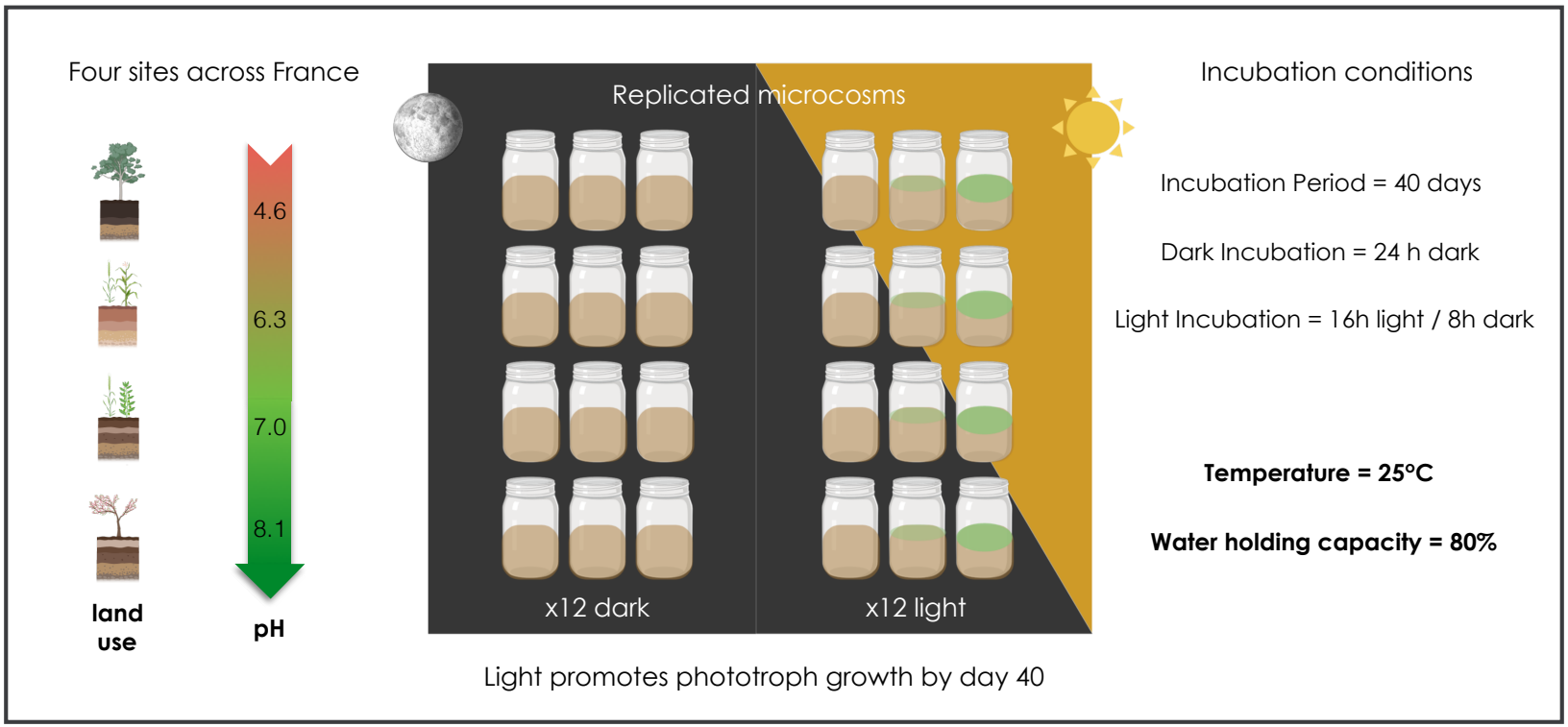
The influence of soil phototrophs on gas exchange and other soil community members is poorly understood



Lisa Wingate, Joana Sauze, Christophe Djemiel, Steven Wohl, Clément Foucault, Nicolas Fanin, Virginie Nowak, Sébastian Terrat, Samuel Mondy, Evert van Schaik, Jérôme Ogée & Pierre-Alain Maron

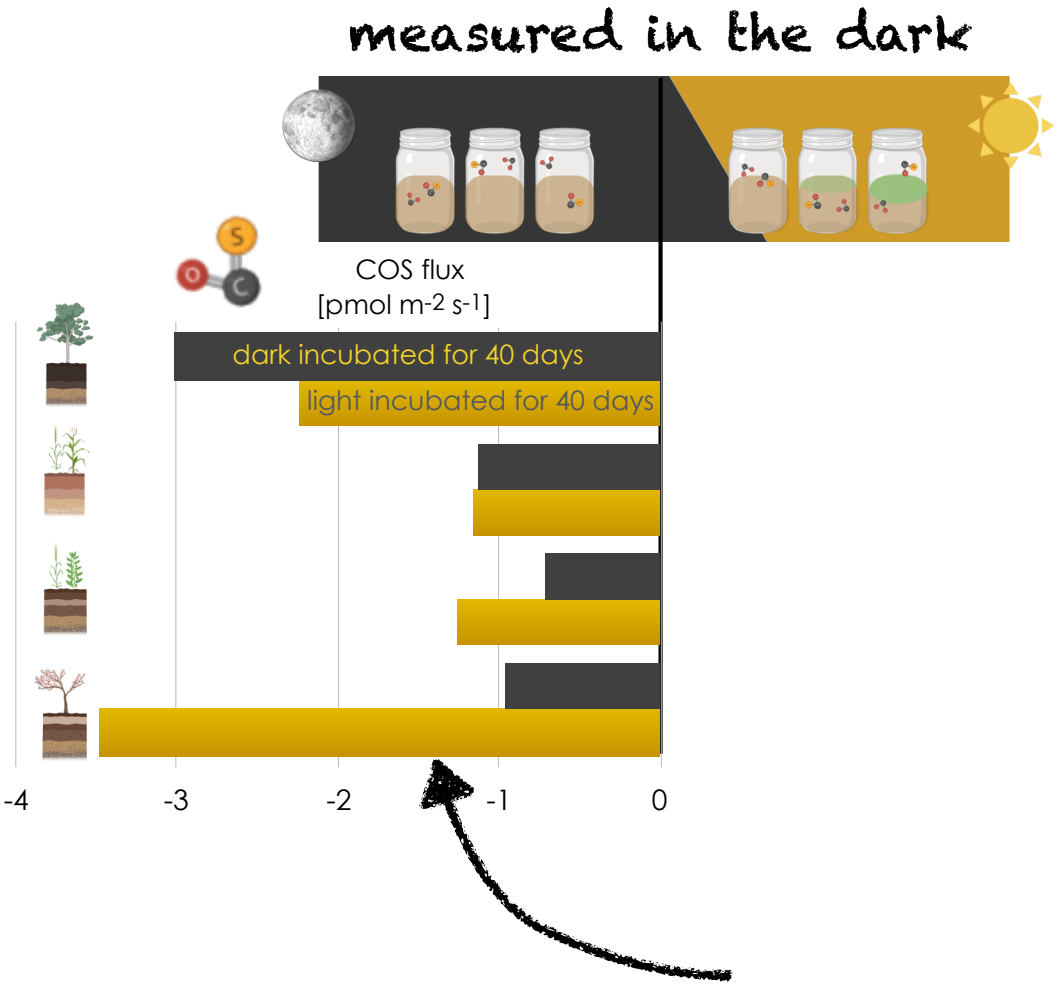
We set up a soil microcosm experiment to test the effect of light on community structure and function

Methodological approach



For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018
https://www.sciencedirect.com/science/article/pii/S0038071717305746?via%3Dihub

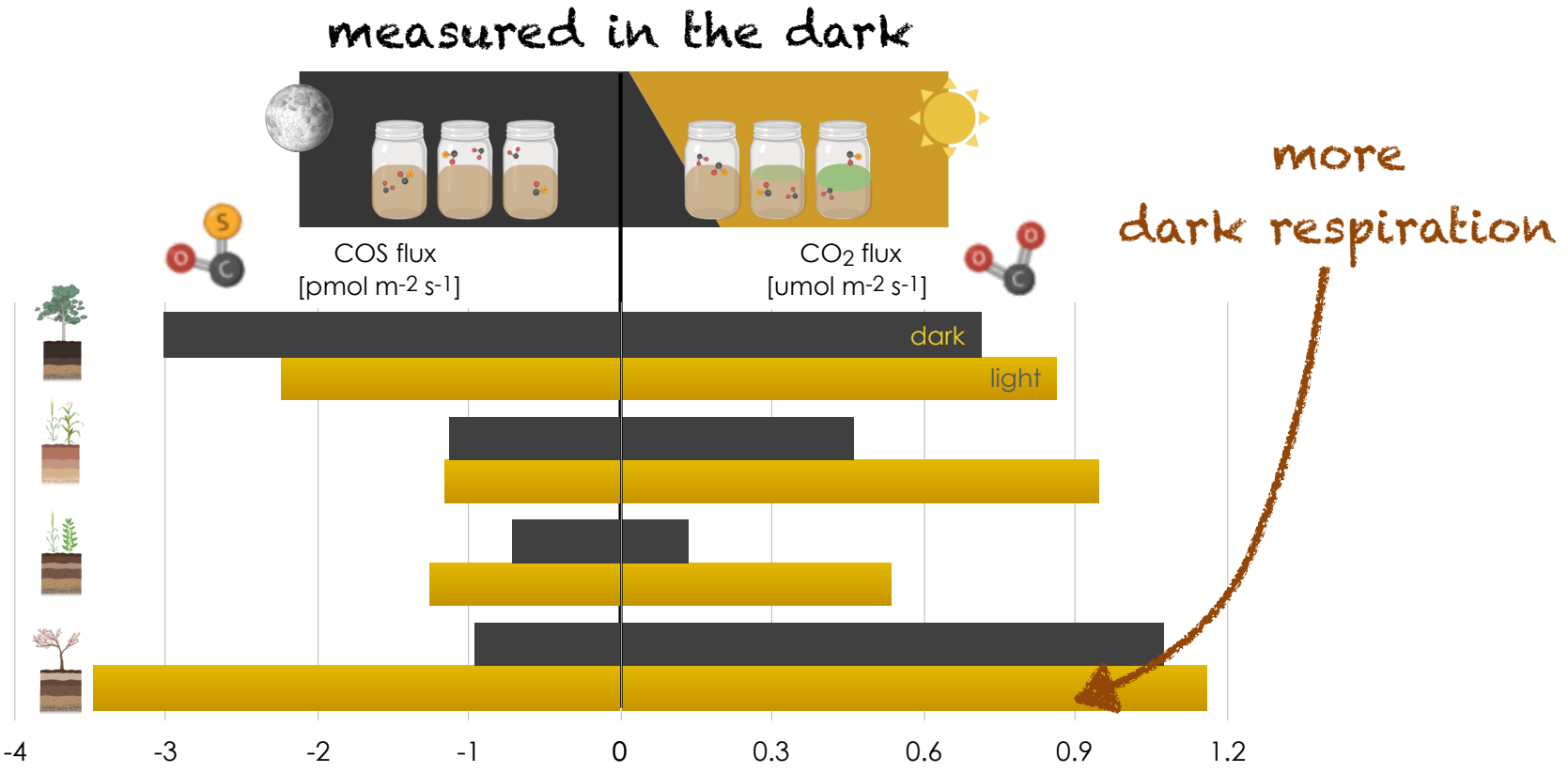
Impact of photoperiod on soil gas exchange across land use



No clear pattern was observed for the COS fluxes across sites or treatments

For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018
https://www.sciencedirect.com/science/article/pii/S0038071717305746?via%3Dihub

Impact of photoperiod on soil gas exchange across land use



CO_2 efflux generally increased in soils acclimated to the day/night cycle.

For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018
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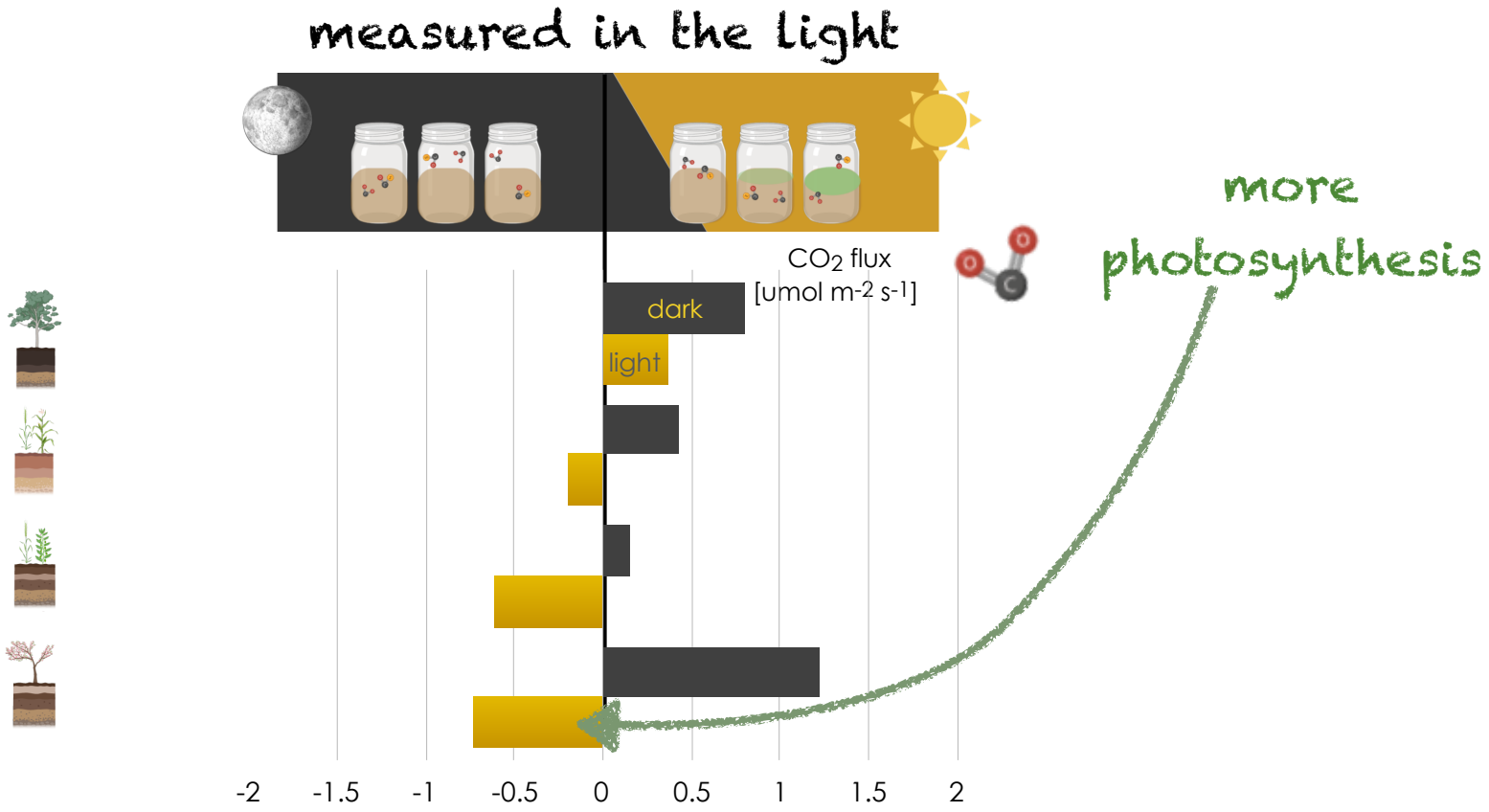
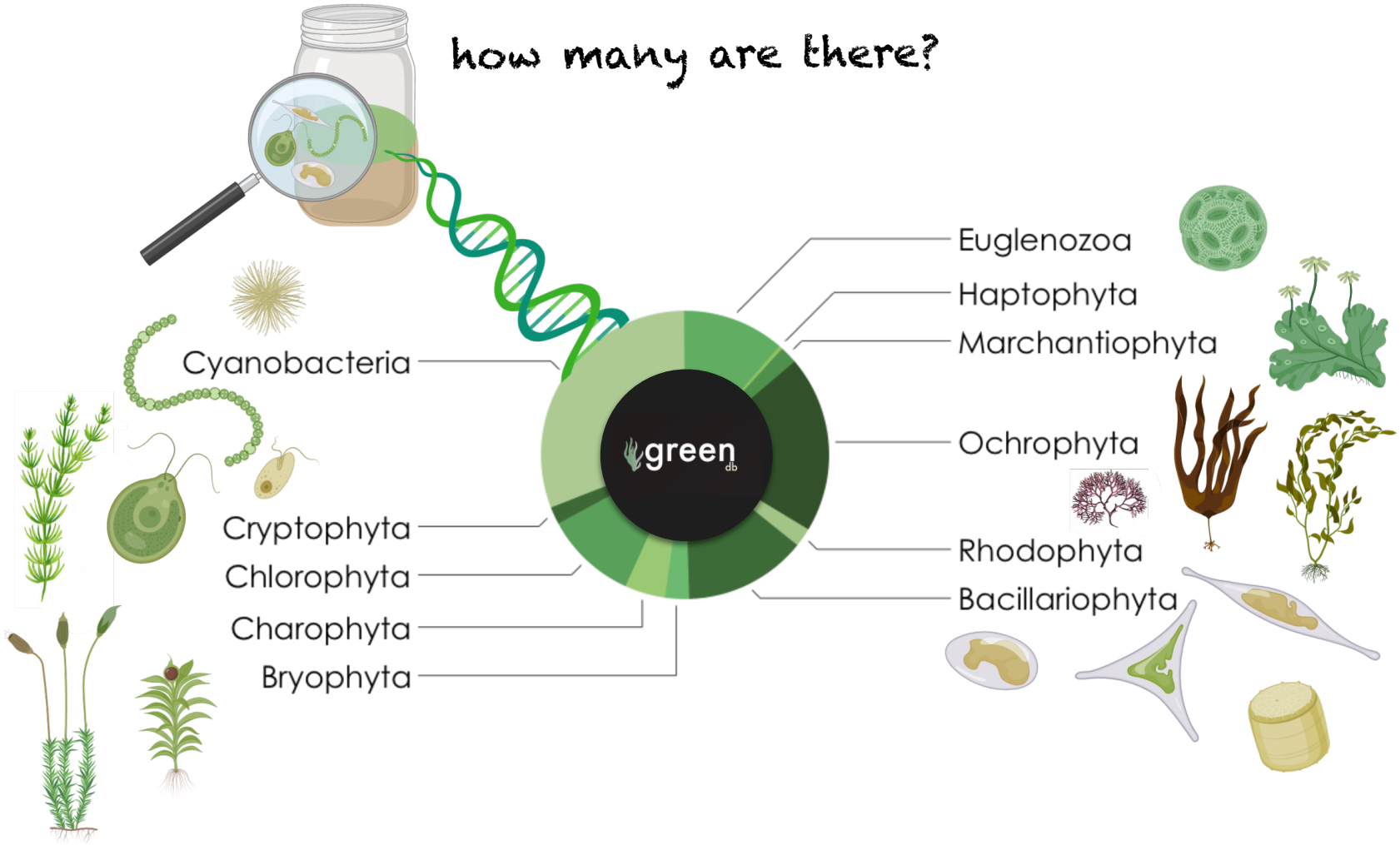
Impact of photoperiod on soil gas exchange across land use



CO_2 efflux measured in the light generally decreased in soils acclimated to the day/night cycle because of photosynthetic activity.

For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018
https://www.sciencedirect.com/science/article/pii/S0038071717305746?via%3Dihub

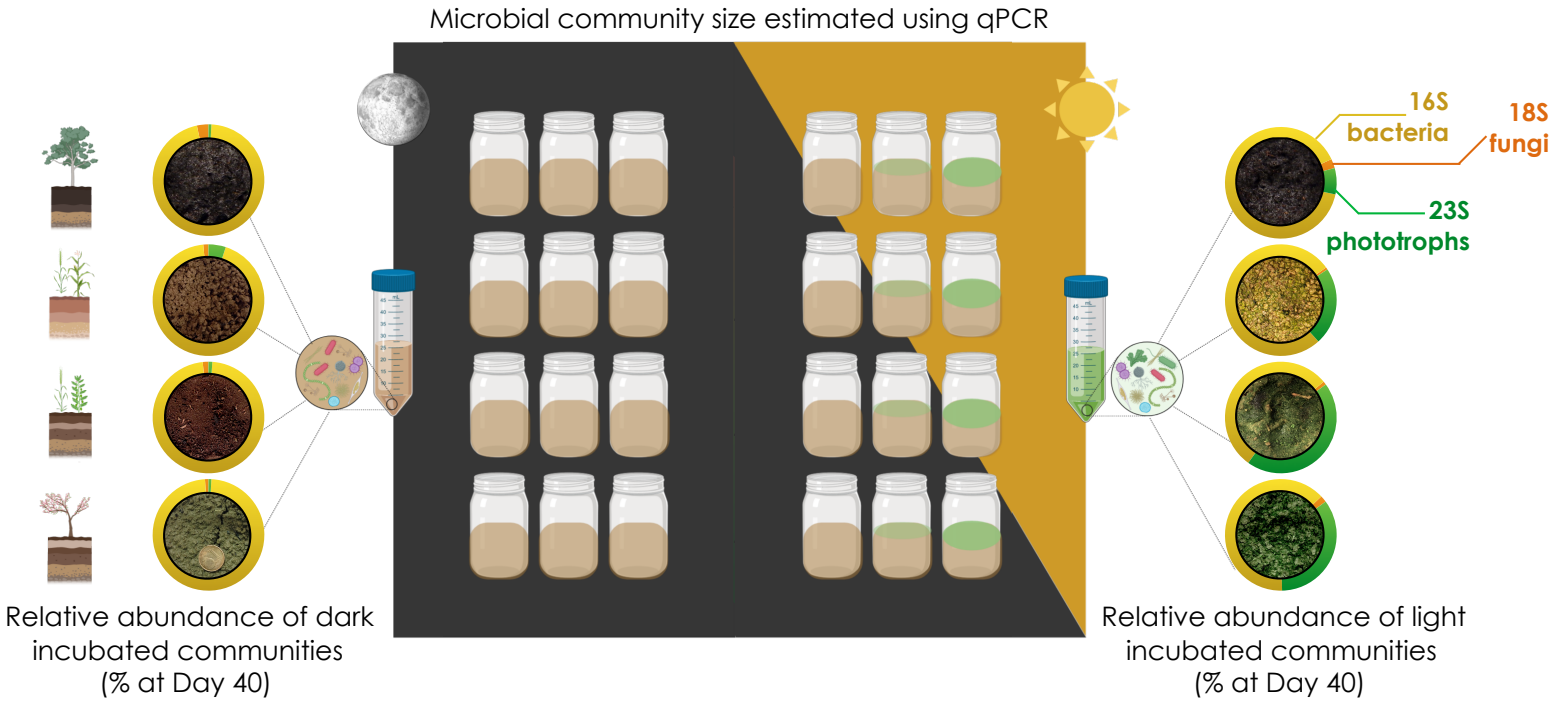
We also developed a new 23S reference database for eukaryotic plastids and cyanobacteria



http://microgreen-23sdatabase.ea.inra.fr/

For more details refer to Djemiel et al., Scientific Reports, 2020
https://www.nature.com/articles/s41598-020-62555-1

Impact of photoperiod on community structure across land use



For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018

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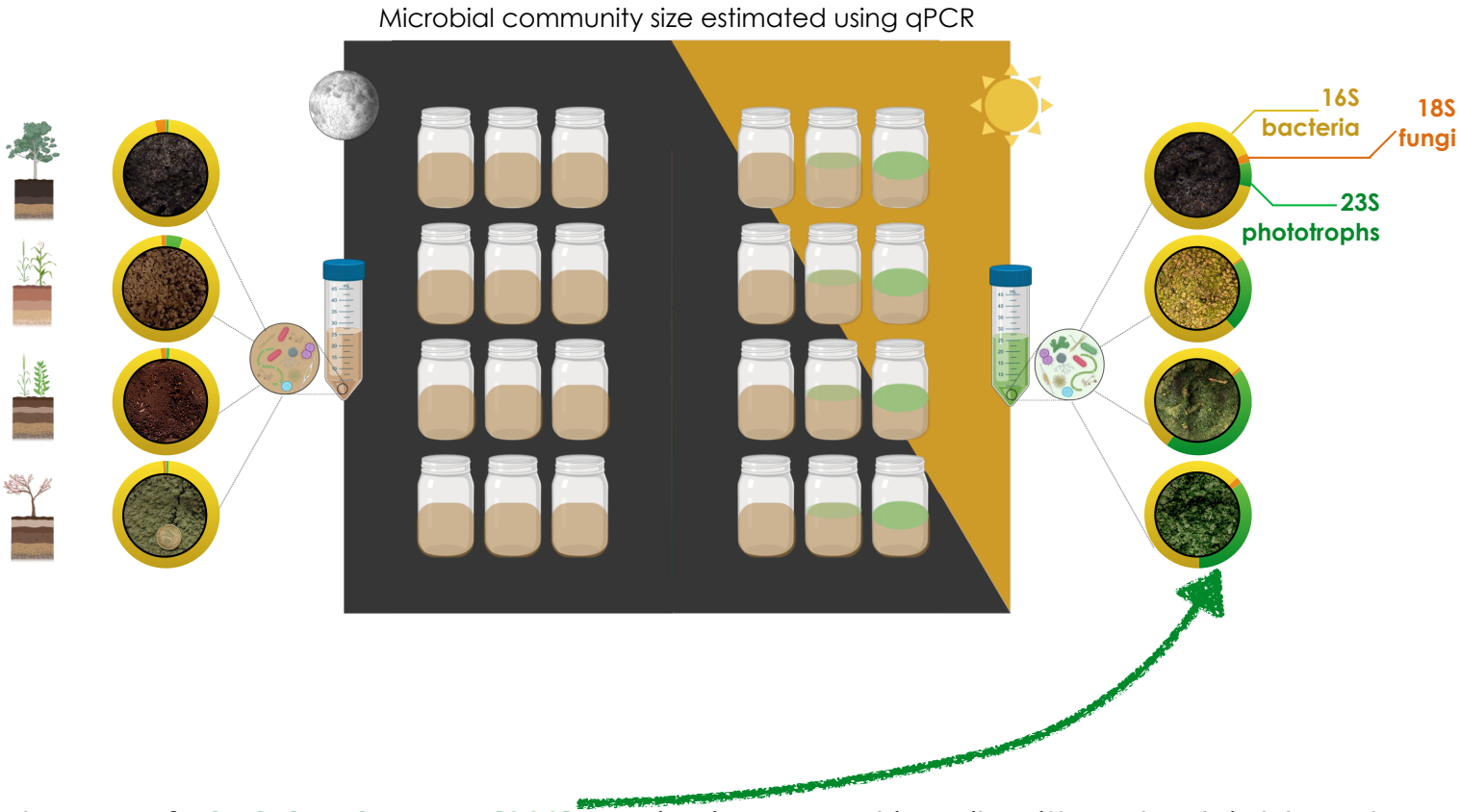
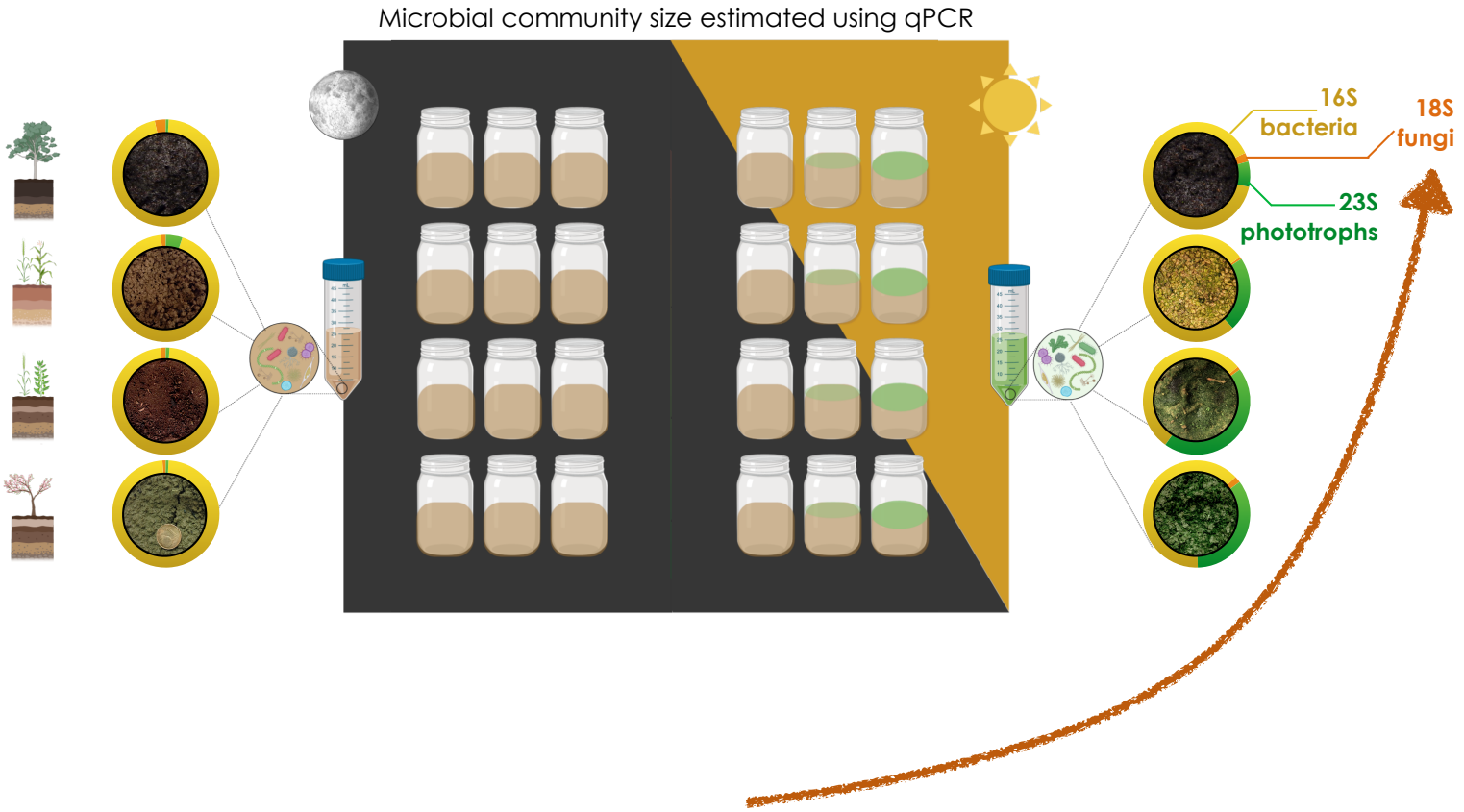
Impact of photoperiod on community structure across land use



The no. of **phototroph gene (23S)** copies increased in soils with a day/night cycle.
The relative abundance of **phototroph gene (23S)** copies increased at higher soil pH.

For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018
https://www.sciencedirect.com/science/article/pii/S0038071717305746?via%3Dihub

Impact of photoperiod on community structure across land use



In the dark the no. of **fungal gene (18S)** copies were highest in acidic forest soils. whilst soils incubated with a day/night cycle showed the opposite pH trend and increased no. of **fungal gene (18S)** copies at higher soil pH

For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018

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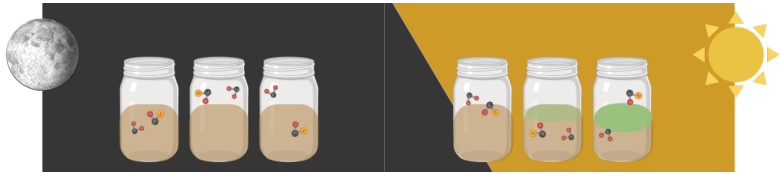
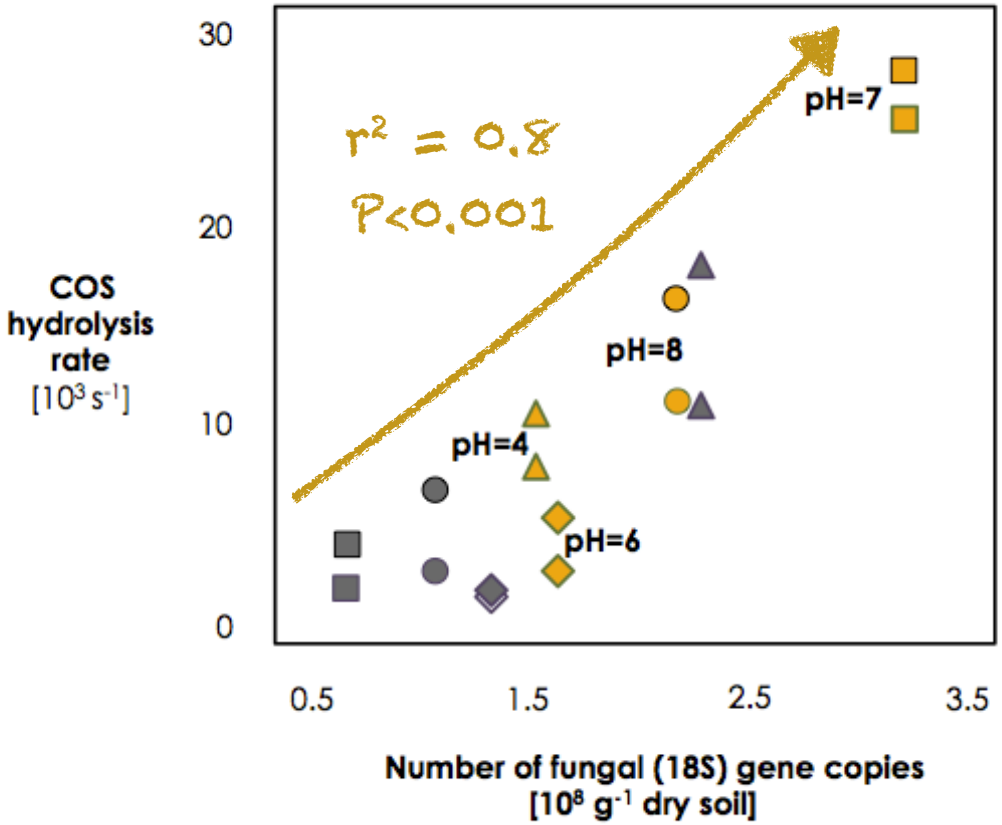
Fungal presence was also linked to COS soil gas exchange



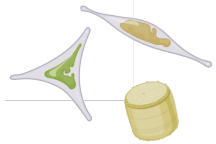


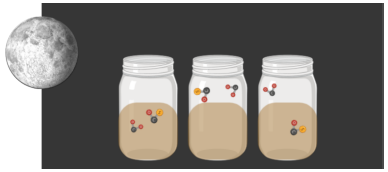
so which phototrophs increased in abundance with COS uptake?

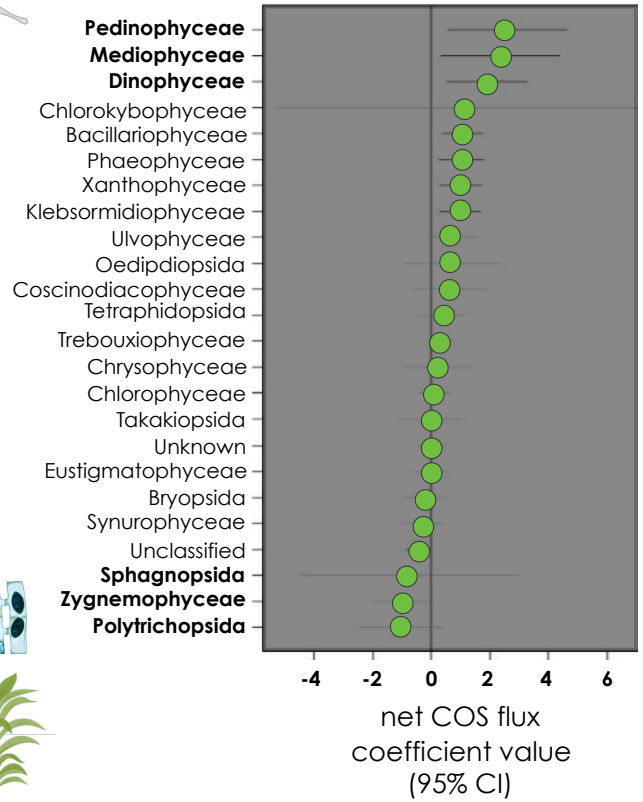
For more details refer to Sauze et al., Soil Biology & Biochemistry, 2018
https://www.sciencedirect.com/science/article/pii/S0038071717305746?via%3Dihub

Which soil phototrophs were affected by the light regime and how did they impact soil COS exchange?

Taxa associated with **low** COS uptake



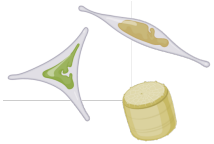


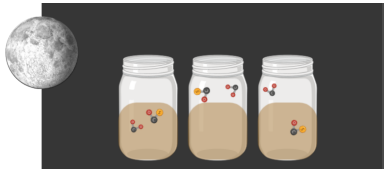


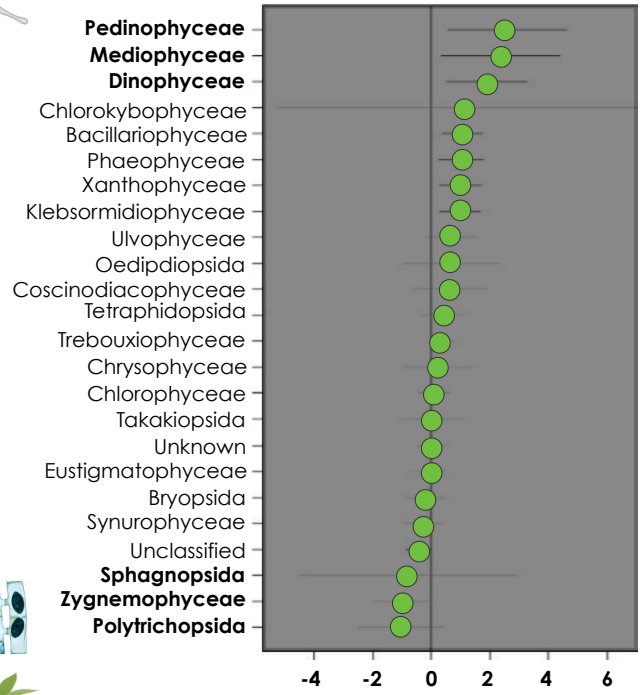
Taxa associated with **high** COS uptake

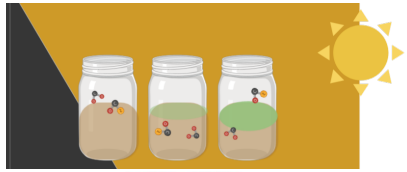
Which soil phototrophs were affected by the light regime and how did they impact soil COS exchange?

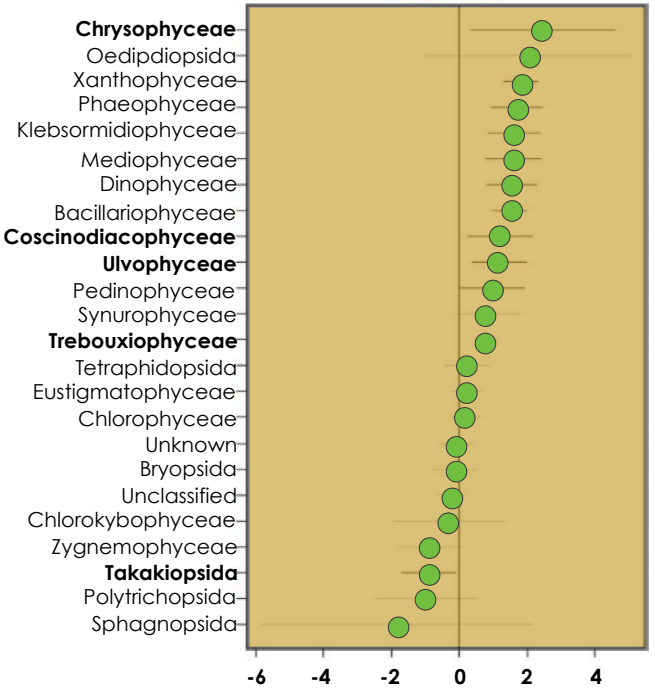
Taxa associated with **low** COS uptake











four algal class

correlated classes exclusive to the light

one moss class

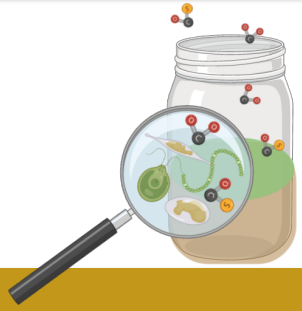
Taxa associated with **high** COS uptake

Conclusion? Bryophyte and fungal interactions in soils seem to regulate COS uptake rates

Perspectives

new tools to study the soil phycosphere
in natural and managed ecosystems

http://microgreen-23sdatabase.ea.inra.fr/



opportunities to study soil phycosphere interactions
with the atmosphere and other soil microbes

Perspectives

new tools to study the soil phycosphere
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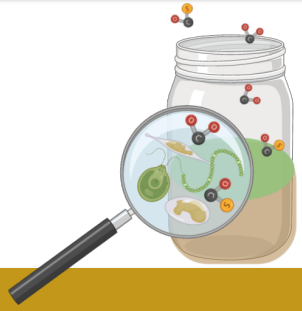

opportunities to study soil phycosphere interactions
with the atmosphere and other soil microbes

More questions?

Visit EGU display D484 EGU2020-20422

Email me @ lisa.wingate@inrae.fr

Twitter @LisaWingateBdx

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