Statistical methods to study microbial communities

C.F.

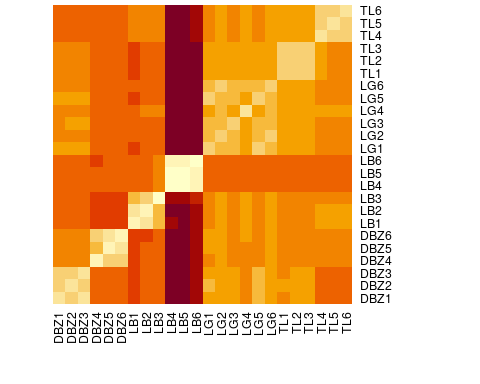
24 février 2020

All three groups will be studied at the genus level, since it is the lowest shared amongst all of our three groups. DBZ, LB, LG and TL are referred as “soils”. DBZ1, DBZ2, DBZ3, … are referred as “samples”

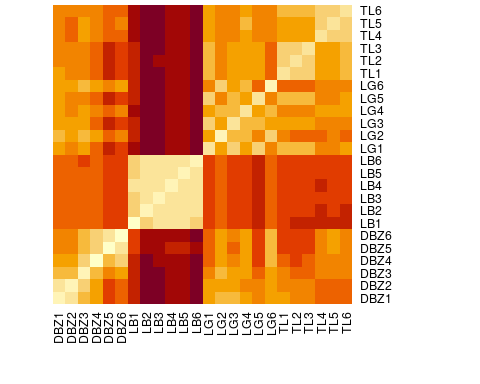
# Dissimilarity analysis

## Heatmaps

By generating a heatmap based on algae community composition, it appears that dark LB soils are the most different when compared to the other soils. On the other hand, LG soils seem rather similar to other soils (lot of bright yellow and orange). TL algal communities do not seem to differ much between light and dark, while the same observation do not apply for the 3 other soils.

  
Illustration 1: Algae genus heatmap

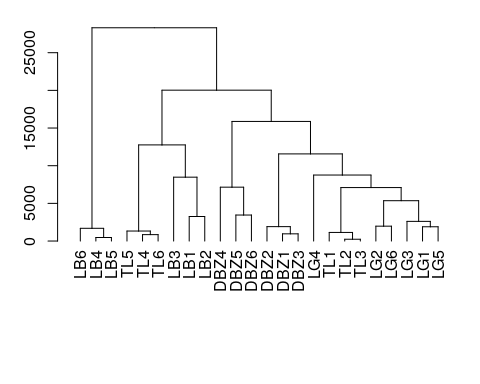
The same observations can be drawn from the bacteria communities heatmap. Altough it is interesting to notice that the light treatment do not affect LB bacterial communities as it affected its algal communities.

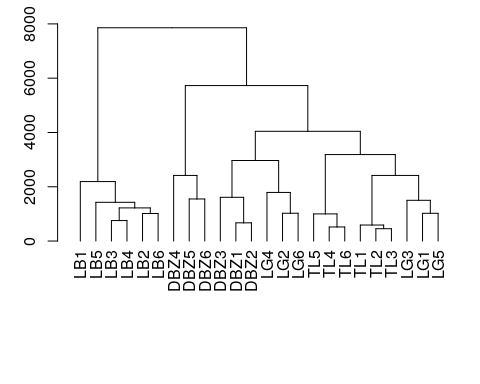
  
Illustration 2: Bacteria genus heatmap

The fungal heatmap remains to be interpreted once data will be uptdated with no columns missing.

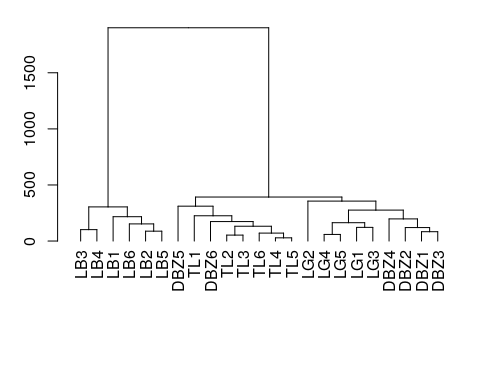
## Clustering trees

A quick look at the algae genus dendrogram confirms the previous observations. Dark LB soils are grouped apart from all the other soils. Most LG soils are placed at the full right of the tree which mean that, on the first hand, LG soils are very similar from each other, no matter the light treatment, and on the other hand, they are the less dissimilar soils from the other 3 soil location when compared to other soils. The last observation is that all soils except LG react to light treatment since they appear grouped by either light or dark conditions. This is expected since phototrophs heavily rely on light to thrive. In dark conditions, the algae community would hence be expected to change, possibly to become more facultative-heterotrophs oriented.

  
Illustration 3: Algae genus dendrogram

However, things looks quite different when algaes are exchanged for bacteria. LB soils still appear as the most dissimilar of all soils, but they are not grouped by light treatment anymore. Nonetheless, DBZ and TL soils bacterial communities still show a reaction to light since they’re grouped by light treatment. Surprinsingly, LG soils, even if they do not show any specific pattern regarding light, seem to be splitted into two different branches, with the first branch being more similar to all TL soils than to the second LG branch. To understand that, we’ll need to look deeper into community composition. Anyway, it seems that bacteria communities show less reaction to light compared to algae communities, which makes sense since bacteria are heterotrophic organisms (cyanobacteria are not included in the bacteria group). 

The fungal communities dendrogram remains to be interpreted once data will be updated with no missing columns.



# Community barplots

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