



Substrate and nutrient limitation regulating microbial growth in soil

Erland Bååth

Lund University, Sweden (erland.baath@biol.lu.se)

Microbial activity and growth in soil is regulated by several abiotic factors, including temperature, moisture and pH as the most important ones. At the same time nutrient conditions and substrate availability will also determine microbial growth. Amount of substrate will not only affect overall microbial growth, but also affect the balance of fungal and bacterial growth. The type of substrate will also affect the latter. Furthermore, according to Liebig law of limiting factors, we would expect one nutrient to be the main limiting one for microbial growth in soil. When this nutrient is added, the initial second limiting factor will become the main one, adding complexity to the microbial response after adding different substrates.

I will initially describe different ways of determining limiting factors for bacterial growth in soil, especially a rapid method estimating bacterial growth, using the leucine incorporation technique, after adding C (as glucose), N (as ammonium nitrate) and P (as phosphate). Scenarios of different limitations will be covered, with the bacterial growth response compared with fungal growth and total activity (respiration). The “degree of limitation”, as well as the main limiting nutrient, can be altered by adding substrate of different stoichiometric composition. However, the organism group responding after alleviating the nutrient limitation can differ depending on the type of substrate added. There will also be situations, where fungi and bacteria appear to be limited by different nutrients. Finally, I will describe interactions between abiotic factors and the response of the soil microbiota to alleviation of limiting factors.