



The role of belowground plant-microbe interactions in climate change induced range shifts

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With climate change, plants have been able to shift their ranges into novel environments where conditions have been made suitable due to warming temperature and changes in precipitation. Much belowground range expansion research has focused on either positive plant-soil interactions, such as AMF symbiosis, or on negative plant-soil interactions, such as pathogens. Less focus has been given to the core microbiome of plant hosts. Many unknowns remain in how the soil microbiome may contribute to plant adaptation to climate change, and how this may feedback to plant-soil interactions and ecosystem functions.

Using high-throughput Illumina sequencing we assessed soil and root microbial communities under native and range expanding plant species spanning a north-south latitudinal transect in central Europe. As expected, the soil and root microbiomes are both strongly influenced by the plant species under which they grow. Specifically, about 10% of the microbiome could be related to the host plant species. Interestingly, we found that microbiomes associated with range shifting species are less variable than those associated with native species. Further, the enrichment of microbes in roots (from the soil) is stronger with range expanding species than with native plant species. Our research indicates that the soil and root microbiomes can provide insight into plant range shifts and may be important for plant establishment. Our results are also important at a continental and global level, as ecosystems and plant communities worldwide are affected by climate change induced range-expansions.