

Researchers collect soil samples from around the globe in effort to conduct fungi survey

November 28 2014, by Bob Yirka



The Fungal World. Credit: Siiri Jüris ja Leho Tedersoo

(Phys.org)—A large team of researchers with members from around the world has conducted a global survey of soil fungi by collecting thousands of soil samples from sites all around the world. In their paper published



in the journal *Science*, the team describes their survey, how they performed DNA analysis on the specimens they found, and what they learned in doing so. David Wardle and Bjorn Lindahl of the Swedish University of Agricultural Sciences offer a Perspectives piece on the work done by the team in the same journal issue.

Up till now, the team notes, research looking into <u>biological diversity</u> has focused much more on plants and animals that live on the surface of the Earth, which quite naturally are easier to study. Much less work has been done to better understand what goes on beneath, particularly regarding very tiny organisms. In this major undertaking, the team of researchers sought to learn more about fungi by collecting soil samples from sites across the planet. In all, they collected approximately 15,000 <u>soil</u> <u>samples</u> from 365 sites which included every continent, save Antarctica—most were from forested areas. The samples were then tested to see which types of fungi might be living in them. For that, pyrosequencing DNA analysis was used, which led to the generation of 25 million sequences. Putting all the information in a database allowed the team to find patterns.

One of the most striking patterns they found was that fungi diversity is not related to aboveground plant diversity, instead, it's mostly driven by weather conditions, tied mainly to rainfall. The second driver appeared to be pH level in the soil and calcium concentrations. They noted that diversity was highest around the equator and that the richness of fungi in the soil did not tend to decline with latitude as much as aboveground plants, though it did decline more than many experts had predicted, which might mean changes to theories that are based on the idea of constant fungus distribution.

The work done by the team will undoubtedly lead to a better understanding of belowground biodiversity, but as the team notes, their work only involved a very small percentage of places where fungi reside,



which suggests many more such surveys will need to be conducted before a complete picture of <u>fungi</u> diversity can be made.

More information: Global diversity and geography of soil fungi , *Science* 28 November 2014: Vol. 346 no. 6213 . <u>DOI:</u> <u>10.1126/science.1256688</u>

ABSTRACT

Fungi play major roles in ecosystem processes, but the determinants of fungal diversity and biogeographic patterns remain poorly understood. Using DNA metabarcoding data from hundreds of globally distributed soil samples, we demonstrate that fungal richness is decoupled from plant diversity. The plant-to-fungus richness ratio declines exponentially toward the poles. Climatic factors, followed by edaphic and spatial variables, constitute the best predictors of fungal richness and community composition at the global scale. Fungi show similar latitudinal diversity gradients to other organisms, with several notable exceptions. These findings advance our understanding of global fungal diversity patterns and permit integration of fungi into a general macroecological framework.

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