**PhD: FOOD SCIENCE**

**Title:**

Characterization and modelling of the processes of soil organic matter decomposition and food digestion in animals and humans

**Proposing supervisor:**

Prof. Stefano Mazzoleni

**Research project**

Soil, as well as animal and human guts, support a vast microbial biodiversity, in which different microbiota plays critical roles in regulating organic matter cycling, nutrients release and uptake and biological control of harmful organisms. The functional link between organic matter input and microbiota compositions with ecosystem functionality and disease suppression has not been fully explained yet. In this project, we will investigate, integrating experimental and modelling work, the complex interconnections between microbiota, organic matter decomposition and food digestion in relation to soil and mammals’ health. The study will focus on highlighting the differences and the similarities between the considered systems. In mammals, diet obviously plays a pivotal role in health, with unbalanced food intake being linked to several chronic diseases. Diet not only provides essential nutrients and carbon sources to support human metabolism, but also feeds the gut microbiota thus modulating human physiology, psychology, and, finally, health. Similarly, the amount and chemical quality of organic input in the soil ecosystem shapes the microbiota and, in return, controls soil functions. Restoration of dysbiotic microbiota can be pursued by managing the frequency of application and the biochemical quality of organic amendment in soil or by modulating diet composition in the case of guts. In this context, diets are usually classified based on energy intake and/or based on the relative amount of macromolecular chemical groups. Here, we will apply the concept of ecological stoichiometry to both soil organic matter cycling and food digestion. We expect that the new approach will define new strategies to promote soil microbiota biodiversity and functionality, improving the connection with plant yields and mammals’ health, and their possible integration through a “One Health” framework.

**Grant availability** (funds to support the research activities):

Contract with No self srl

**Collaborations with foreign institutions** (max 500 characters):

* Tushar C. Sarker, State Key Laboratory of Subtropical Silviculture, Zhejiang A&F University, Linʹan District, 666 Wusu Street, Hangzhou, 311300, China
* Alexey Doroshkov, Novosibirsk State University (NSU), Novosibirsk, Russia