

M.Sc. thesis opportunity

Technical University of Munich in collaboration with the Research Institute of Organic Agriculture (FiBL) and the University of Hohenheim

Comparison of how organic and conventional farming affect the storage of organic carbon and soil structure in subtropical Vertisols: Surveying the development of important soil health indicators in a long-term experiment in Madhya Pradesh, India

Topic and aims: Carbon is stabilized in soils by diverse chemical and physical mechanisms. Fine clay-sized particles are often found to enhance the storage of organic carbon. However, clay-rich Vertisols under subtropical climate often do not follow this trend and contain relatively less organic carbon under agricultural use despite their dark color. Vertisols are often used for cotton cultivation, which is why they are often called ‘black cotton soils’. The long-term system comparison set up in 2007 by FiBL and the bioRe association in Madhya Pradesh, India, provides an ample opportunity to get insights into the storage of organic matter in soils under organic and conventional farming systems.

Organic matter management is often expected to improve soil structural properties hand in hand with building the storage of organic carbon. Most of our knowledge is based on temperate ecosystems whereas subtropical conditions might result in much different dynamics. In this work, we want to assess how the storage of carbon in major organic matter fractions evolve over time comparing the different farming systems, to which extent soil aggregate structures influence the storage of organic carbon, and whether exchangeable sodium may retard the accrual of carbon. The mechanistic insights shall be related with overarching practical aspects and pressing issues of soil health under cotton cultivation. Overall, the work is expected to contribute to the livelihood and food security in a subtropical ecosystem.

Work program: Soil sampling in India (February/March 2024), afterwards analysis of long-term monitoring data and conductance of laboratory measurements, joint data interpretation with collaboration partners and writing of M.Sc. thesis. Important before starting: It is required to participate in a proposal writing to apply for funding of travel costs by a third party. At the research site, the following facilities will be provided: Basic accommodation and food, field work support from the local staff, and transport required for field work.

Required profile: M.Sc. student with interest in soil science or related biogeochemistry disciplines, willingness to travel and conduct field sampling in India as well as laboratory analyses, communication skills to work with diverse partners as part of a larger project team.

To apply please send letter of motivation discussing your research ideas and interests and describe how past academic or non-academic experiences have prepared you for this work (as soon as possible).

Interested? Questions? Contact Dr. Steffen Schweizer (TUM) by email steffen.schweizer@tum.de

