Analyze the effect of tillage on arbuscular mycorrhizal fungi

Starting date:
February to August 2025
or September 2025 to February 2026
(I am open to slight changes in the timeframe if needed)

Background:
Arbuscular mycorrhizal (AM) fungi are symbiotic organisms that colonize the roots of most plants, establishing a vital link between plants and the soil. These fungi rely on carbohydrates from plants to sustain their growth while offering multiple advantages in return. AM fungi develop extensive networks of fungal filaments (hyphae), forming extraradical mycelia (ERM). By increasing plant roots' surface area, ERM allow plants to access a larger volume of soil for essential nutrients and water. Further, AM fungi may enhance plant physiology and tolerance to biotic and abiotic stresses. ERM are thought to provide the best source of AM fungal propagules achieving fast root colonization of crops. However, tillage breaks ERM and thus, may reduce the benefits crops could gain from AM fungi.

Research question:
Does tillage reduce AM hyphal density in the soil and maize root colonization by AM fungi?

Activities:
You would join an ongoing research project examining the role of ERM in enhancing maize performance. The field site is located at campus Wiesengut, the organic agricultural teaching and experimental facility of the University of Bonn, located in Hennef.

Main tasks:
Field work (at Wiesengut)

- Plant monitoring
- Soil sample collection

Lab work (will take place at Auf Dem Hügel 6, Bonn)

- Extracting AM fungal hyphae and quantifying under a microscope
- Clearing and staining roots to assess AM fungal colonization under a microscope

(all the methods will be demonstrated)

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