**METHODS**

**Experimental design and soil sampling.** The study was conducted in the DOK (German abbreviation for dynamic, organic, and conventional agricultural management) field, which has been studied under long-term different farming systems (Mäder et al. 2022; Hartmann et al. 2012), in 2022. Among five different original fertilization plots in the DOK field, the rain-out shelter experiment was set up in three of them based on the contrasting management treatments.

**DNA extraction**

**AmoA gene abundance quantification**

**PCR amplification and amplicon sequencing**

**Amplicon sequence analysis**

**Microbial community analysis**

**Data and code availability**