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Organic matter content and mineralizability in mineral and organic soils under long-term fertilization

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Organic matter content and availability to microorganisms in mineral and organic soils is very different, showing unequal response to destabilizing impacts, particularly to fertilizing. Mineralizability of soil organic matter (SOM) – share of carbon, mineralized during long-term incubation, in initial content of soil organic carbon (Corg) – is depend on the ability of microorganisms to utilize SOM and determines losses of easily decomposable SOM fractions and CO2 emission to the atmosphere. The long-term field experiments data allowed us to establish real Corg dynamics in peat and soddy-podzolic sandy soils. Estimation of SOM mineralizability helps us to evaluate its resistance under fertilizing. We defined that mineral and organic fertilizers application during 25 years lead to the increase in Corg content in soddy-pozdolic sandy soil from 0.66 to 0.99% and SOM mineralizability enhancement from 6.4 to 8.3%. Peat soils mineralization depends on Corg content and ash percentage (AP) in peat. In peat soil with initial Corg 10% and AP 70% after 12 years of NPK application Corg declined to 9%, SOM mineralizability decreased in 1.6 times, and CO2 emission stabilized on the level of that of mineral soil. In peat soil with initial Corg 30% and AP 20% NPK application during 25 years reduced Corg to 27%, decreased SOM mineralizability in 1.2 times, and CO2 emission was in 6 times higher than in peat soil with greater AP. The results allow us to forecast further quantitative and qualitative changes in organic matter of soils under study.
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