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Are carbon-storing soils more sensitive to climate change? A laboratory evaluation for agricultural temperate soils.

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Global warming is leading to increased temperatures, accentuated evaporation of terrestrial water and increased the atmosphere moisture content, resulting in frequent droughts and heavy precipitation events. It necessary to assess the sensitivity of soil organic carbon (SOC) under storing practices in response to increasing soil moisture, temperature and frequent dry-wet cycles in order to anticipate future soil carbon losses. We evaluated the impact of these climatic events through an incubation experiment on temperate luvisols from conservation agriculture, organic agriculture, organic waste products applications, i.e. biowaste, residual municipal solid waste and farmyard manure composts compared with conventionally managemed soils. The alternative management options all have led to increased SOC stocks. Soil samples were incubated in the lab under different temperatures (20, 28 and 35°C), different moisture conditions (pF1.5; 2.5 and 4.2) and under dry(pF4.2)-wet (pF1.5) cycles. Dry-wet cycles caused CO2 flushes but overall did not stimulate soil carbon mineralization relative to wet controls (pF1.5 and pF2.5). Overall the additional SOC stored under alternative management options was not more sensitive to climate change (temperature, moisture, dry-wet cycles) than the existing SOC.