

专论与综述

土壤有机碳稳定机制研究进展

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摘要 土壤有机碳的增加不仅有助于农业可持续发展, 而且对缓解温室气体增加和全球气候变化等也具有重要意义。土壤有机碳的稳定机制决定着土壤固定和储备有机碳的能力, 对有机碳稳定机制的研究, 将为政府制定有效的温室气体减排措施提供依据。土壤有机碳的稳定机制主要包括: (1) 有机碳的难降解性; (2) 金属氧化物和粘土矿物与有机碳的相互作用; (3) 土壤团聚体的物理保护导致的生物与有机碳空间隔离; (4) 土壤生物学机制, 主要指土壤生物自身对有机碳稳定性的直接贡献。至今, 有机碳稳定性的主导机制尚不清楚, 但影响因素与生态系统类型、土壤类型、土层深度、土壤管理措施、土壤生物活性及群落组成等有关。作者建议今后研究有机碳稳定性机制时, 应同时考虑上述4种机制的综合作用, 并加强探索土壤生物的贡献。

关键词 [土壤有机碳](#); [难降解性](#); [金属氧化物](#); [粘土矿物](#); [团聚体保护](#); [土壤生物](#); [稳定机制](#)

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A review on mechanisms of soil organic carbon stabilization

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Abstract Increasing soil organic carbon (SOC) levels play a critical role in agricultural sustainability and, maybe more important, in mitigating greenhouse effects and global climate changes. The mechanisms of SOC stabilization are associated with the capacity of SOC sequestration, and studies in this field will help the governments make efficient policies and decisions to reduce greenhouse gas emission. This paper gives a brief review of four stabilization mechanisms of SOC: (1) recalcitrance of organic carbon compounds, (2) interactions with metal oxides and soil mineral surfaces, (3) spatial inaccessibility against decomposers because of micro-aggregate's physical protection, and (4) biological mechanisms, mainly the direct contributions of soil organisms themselves. Until now there are contradictorily results regarding the dominant SOC stabilization mechanisms, possibly depending on factors, such as ecosystem and soil type, soil depth, soil managements, as well as soil biological activity and community composition. The authors will consider future research proposals with an emphasis on a comprehensive understanding of all four mechanisms of SOC stabilization, and will pay more attention on roles of soil bio-community.

Key words [soil organic carbon](#) [recalcitrance](#) [metal oxides](#) [clay mineral aggregate protection](#) [soil organism](#) [stabilization mechanisms](#)

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