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Conservation management systems improve soil health and crop yields in tropical sandy soils

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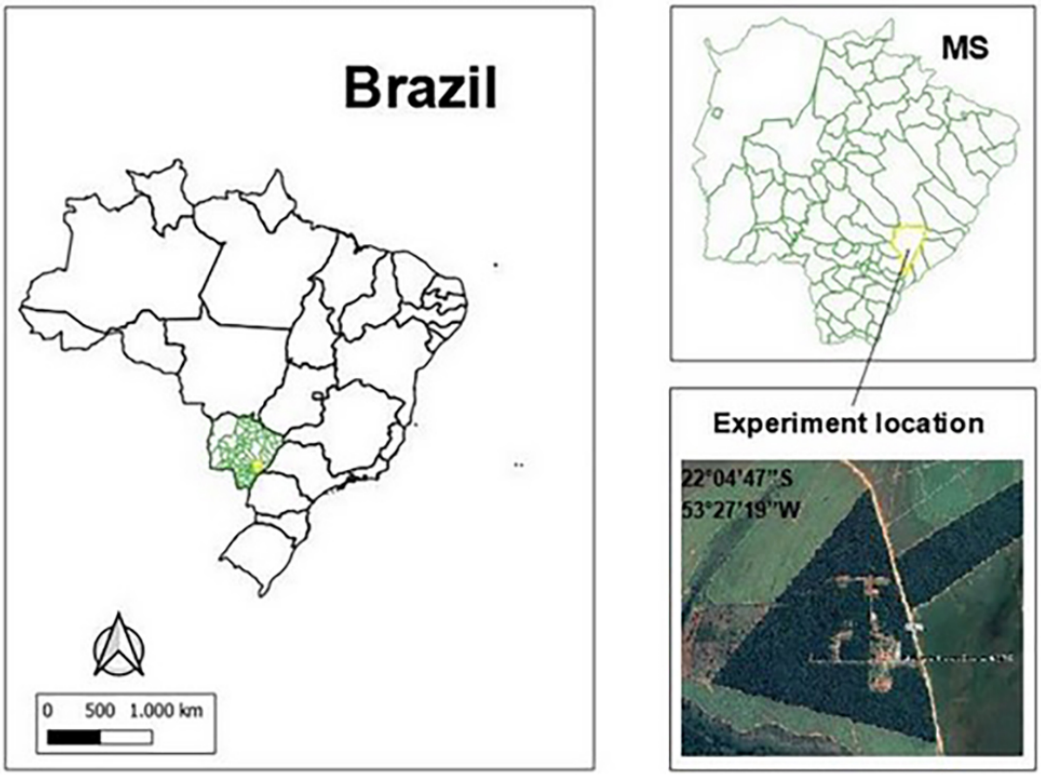

Experimental site at the Instituto Federal de Mato Grosso do Sul (IFMS) in Nova Andradina, Brazil. Image courtesy of Elcio Ferreira dos Santos, IFMS.

Tropical sandy soils are widely used for agriculture in regions such as Brazil's Cerrado, but they degrade easily because they contain little organic matter and have low biological activity. Improving soil health in these areas is essential to maintain crop yields and long-term sustainability.

Even with the growing use of conservation practices, there is still limited information on how integrated production systems affect soil quality and crop performance in sandy tropical soils, especially during the first years after adoption.

A recent study in the *Soil Science Society of America Journal* compared conventional tillage, degraded pasture, no-tillage, integrated crop–livestock–forest systems, and native vegetation in a tropical sandy soil. Conservation systems, particularly integrated crop–livestock–forest and no-tillage, quickly increased soil organic matter and soil enzyme activity within two years. These improvements were mainly observed in the surface soil and were linked to higher soybean yields and better plant physiological performance. In contrast, degraded pasture and conventional tillage showed poor soil conditions and lower productivity.

Overall, the results show that conservation-based systems can rapidly improve soil health and crop performance, even in sandy soils. Integrated and no-till management represent practical and effective strategies to support sustainable agriculture in

tropical regions.

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Inacio, K. A. M., Fonseca, A. H. H., Trovato, G. H. C. M., Oliveira, A. A., Queiroz, R. P., Santos, M. L., Mauad, M., & Santos, E. F. (2025). Soil organic matter and enzyme activity in tropical sandy soils under integrated and conventional land uses. *Soil Science Society of America Journal*, 89, e70151. https://doi.org/10.1002/saj2.70151

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