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Improvements of the Profil Cultural Method for a better Low-tech Field Assessment of Soil Structure under no-till

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In France, agronomists have studied the effects of cropping systems on soil structure, using a field method based on a visual description of soil structure. The "profil cultural" method (Manichon and Gautronneau, 1987) has been designed to perform a field diagnostic of the effects of tillage and compaction on soil structure dynamics. This method is of great use to agronomists improving crop management for a better preservation of soil structure.
However, this method was developed and mainly used in conventional tillage systems, with ploughing. As several forms of reduced, minimum and no tillage systems are expanding in many parts of the world, it is necessary to re-evaluate the ability of this method to describe and interpret soil macrostructure in unploughed situations. In unploughed fields, soil structure dynamics of untilled layers is mainly driven by compaction and regeneration by natural agents (climatic conditions, root growth and macrofauna) and it is of major importance to evaluate the importance of these natural processes on soil structure regeneration.
These concerns have led us to adapt the standard method and to propose amendments based on a series of field observations and experimental work in different situations of cropping systems, soil types and climatic conditions. We improved the description of crack type and we introduced an index of biological activity, based on the visual examination of clods.
To test the improved method, a comparison with the reference method was carried out and the ability of the "profil cultural" method to make a diagnosis was tested on five experiments in France, Brazil and Argentina. Using the improved method, the impact of cropping systems on soil functioning was better assessed when natural processes were integrated into the description.