

## Indicators of biological activity and health of an Andean soil of Ecuador under agronomic management

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### Abstract

The sustainable management of agricultural soils in Ecuador is imperative in view of the degradation processes of this natural resource caused, among other factors, by the inappropriate use of machinery and crop residues, accentuated by the topography with steep slopes in most of the inter-Andean region and by the lack of conservation tillage systems and integrated soil fertility management. This problem is aggravated by the lack of validated protocols or indicators to evaluate the sustainability of agricultural soil management practices. Therefore, the Faculty of Agricultural Sciences of the Central University of Ecuador has evaluated the sustainable soil management protocol proposed by the Food and Agriculture Organization of the United Nations [FAO] in two field experiments, considered pilots in Ecuador within the framework of the project «Support to regional cooperation for climate management of agricultural ecosystems with emphasis on water and soil (TCP/RLA/3805)». The experiments are in Tumbaco-Pichincha. No-tillage [NT] and crop rotation were implemented in Experiment 1; and NT, crop rotation and nitrogen fertilization were implemented in Experiment 2. The variables evaluated were crop productivity, soil organic carbon, bulk density, basal soil respiration and macrofauna diversity. The results for Experiment 1 showed NT with high compliance with the voluntary guidelines for sustainable soil management, medium compliance for the bean-corn-bean-corn rotation versus continuous corn and low compliance for the barley-barley-bean-bean rotation versus continuous bean, and medium compliance for the interaction of crop rotation and NT. The results for Experiment 2 showed the practice of nitrogen fertilization with high compliance with the voluntary guidelines for sustainable soil management in the bean-corn-bean rotation and medium compliance for the bean-amaranth-bean rotation. As for tillage and the interaction of tillage and nitrogen fertilization showed medium compliance for the two rotation schemes. The differences evaluated by the protocol showed significant statistical differences for the effects of the practices, which allows inferring that the protocol and its indicators are adequate tools for the evaluation of sustainable soil management practices.

**Keywords:** Soil quality, Basal respiration, No-tillage, Crop rotation.

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