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Ecological services and biophysical functioning of agriecological soils of Burkina Faso

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To face the soil degradation and the loss of fertility in the Sudano-Sahelian zone, more agronomists think of a new paradigm based on agroecology. The agroecological revolution provides scientific bases and new standards to address the functioning of the agro(ecosystems) based on ecological intensification i.e. ecological processes of the natural ecosystems to produce more and on a sustainable basis bringing together agronomical, biophysical and human sciences. To promote a diversification of the agro(ecosystems) of production at different spatial scales (from the field to the watershed), several fundamentally interlinked problems (climate, erosion, loss of biodiversity degradation and socioeconomic determinants) that affect natural resources (water and soils) have to be taken into account.

Within the framework of the BIOSOL project, agricultural soils from sustainable-intensified agroecological systems (compost, multi-specific vegetal associations, direct sowing, rameal chipped wood etc.) of several regions of Burkina Faso in different pedoclimatic and cultural contexts were investigated. On a biophysical plan, the aim of the project is to increase the scientific, technical and operational knowledge of the traditional and innovative biophysical techniques for the agronomical development and the preservation of natural resources. The study of the soil degradation, increase of the organic matter content and soil structural stability and of the increase of the soil microbial diversity was conducted in order to restore the soil organic fertility and its protection against the erosion. In this work, the pedological, geochemical and microbiological characteristics of agricultural soils were assessed together with the study of both traditional and agroecological agricultural practices in order to make an inventory of soil fertility and crop yields. The effects of agricultural practices based on some Eco-Systemic Services on crop yield and several soil fertility indicators whether physical (water transfer functions), chemical (e.g. nutrient availability) or biological (soil biomass, community structure and activity of micro-organisms) were investigated in parallel with the determination of various pedo-physical and chemical parameters.

Results from this study showed that some Eco-Systemic Services in the soil agroecosystems have significantly influenced the crop yields, soil fertility including the functions of soil microbial community and hence probably its composition. More generally, catabolic diversity of soil microbial community is variable under contrasted climatic and the influence of various agricultural practices. This may indicate

that the efficiency of soil quality restoration is under the control of many natural and anthropogenic factors which could be further investigated.

