Editorial

Crop Residue Contribution to Fertility in No-Till Systems

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Crop residues are sources of nutrients and organic matter when they decompose and contribute to the maintenance of soil fertility in agroecosystems. The decomposition of crop residues is influenced by many physical, chemical and biological factors, such as placement in the soil profile, climatic conditions, chemical composition of the residues, diversity, abundance and activity of the microbial decomposer community, etc.

No-till (NT) system is a key consideration when attempting to improve sustainability of agroecosystems. While other crop production systems based on intensive tillage have resulted in soil degradation and even desertification in some cases, the adoption of NT technology has led to a reversion of this process. NT system promotes soil health and conservation through the combination of both, minimal soil disturbance and soil cover by surface crop residues. These particular conditions are similar to those found in natural ecosystems, and distinctly different from intensive tillage-based production systems.

This special issue of *The Open Agriculture Journal* on crop residue contribution to fertility in no-till systems, provides research in different issues related to fertility and their response to crop residues management in NT systems. Soil fertility in agroecosystems is strongly influenced by the rates of addition and decomposition of organic residues. In this sense, the sustainable intensification of agriculture has been considered an alternative to increase the amount of crop residues returned to the soil. In the southeast of the Humid Argentine Pampa, Martínez *et al.* evaluated the influence of the inclusion of cover crops (fertilized and non fertilized) on biomass producction, carbon (C) and nitrogen (N) accumulation, and soybean grain yield in cropping sequences with high soybean frequency under NT management. They concluded that the incorporation of a cover crop in the crop sequence would be a feasible alternative to increase the contribution of C and N , and to improve the balance of both elements in soil. Furthermore, crop residues in NT systems usually become mixed and decompose simultaneously with other crop residues from different species and with different decomposition degree. In this regard, Casado-Murillo and Abril evaluated the decomposition of crop residues mixtures from two typical crop sequences (soybean monoculture and soybean/maize rotation) after 14 years of NT management. The authors analyzed decomposition rates of the residues mixtures and their components, the annual dynamics of different residue C compounds, and the overall effect on soil organic matter (SOM). They concluded that in long-term NT systems, the decomposition and C dynamics of residues mixtures are strongly influenced by the chemical quality of the residues (particularly soluble C and insoluble fiber concentrations), the proportion in the mixture of residues from different crops and/or decomposition degree, and the seasonal effect.

One of the main agronomic challenges in degraded agoecosystems is to find crop systems that maintain or increase the reserves of SOM (particularly stable components, humic substances) to contribute to the mitigation of the greenhouse effect, enable progress in food security and improve the environment. The paper by Irizar *et al.* aims to study the no-till effect in two crop rotations on SOM and its particle size and biological fractions contents, C and N stubble biomass and different soil properties. They concluded that in the soil and climatic condition of the Argentine Rolling Pampa, intensified crop rotations at a rate of two crops per year or three crops every two years under NT system in the long term retained more C and N in the soil than when they were disturbed under conventional tillage. Otherwise, the mechanisms that are responsible for the humus synthesis are not sufficiently understood. In this regard, in the central semiarid zone of Argentina, Abril *et al.* evaluated the effects of the amount and type of labile and recalcitrant C compounds of crop residues on the SOM components under different NT practices used by local farmers. They concluded that the effect of crop residues quantity on the SOM components is very variable and depends mostly on the management practices under NT. Besides, the authors provided practical recommendations in order to increase the sustainability of the current agricultural management in the area.

It is important to consider that soil microorganims play a key role in the maintenance, functioning and sustainability of agroecosystems, mainly regulating C and N cycling, with direct implications on soil fertility and plant nutrition. The NT system interferes with soil´s physical properties and thus potentially affects the habitat of soil microorganims. Microbial diversity can be used to assess the impact of agricultural practices on the long-term sustainability of cropping sys-

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tems. The aim of Silva *et al.* paper was to investigate the effects of soil tillage systems and crop rotations on the diversity of the soil`s bacterial community in two experiments, one long and the other of short-term set up in southern Brazil. They found that the NT system always resulted in significantly greater diversity than the other more disturbing tillage treatments. The results highlight that bacterial diversity analyzed by DGGE may be useful as bioindicator of changes caused by soil tillage.

Taken togheter, the papers presented in this special issue of *The Open Agriculture Journal* are intended to get a wider comprehension about the effect of surface residues characteristics and decomposition on soil fertility in NT systems. As the Guest Editor of this special issue, I gratefully acknowledge all contributing authors and reviewers whose work and expertise have made this special issue possible, that I hope will be a valuable reference for the readers of *The Open Agriculture Journal*.