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Guest Editorial

Integrated Management of Soil Fertility in Sustainable Agriculture

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Soil fertility is a very fundamental component in agriculture, since it is defined as the ability of a soil to supply adequate nutrients for crops in sufficient quantities in appropriate moment, which are easily assimilated by plants and that their balance or proportion between them is optimal.

Fertility cannot be limited to simply taking soil samples for laboratory analysis and then systematically applying fertilizers to crops. Soil fertility should be interpreted from a comprehensive and sustainable perspective, taking into account aspects related to the historical management of areas dedicated to crops, management practices, organic matter content, drainage, presence of micro and macro- organisms, probable sodium limits, high concentrations of aluminum, soil contamination by agrochemicals, traces of herbicides, soil pH, nutrient balance for each crop, availability, assimilability and fixation of nutrients, soil moisture, time of application, crop status, erosive potential, development of plant roots, presence of pests in the soil, apparent density, levels of compaction, texture, infiltration, lithological discontinuities, types of fertilizers and forms of application, volatilization losses, etc.

Then, is very important to develop soil detailed surveys, so that let us how is our soil, to know the physical, chemical, mineralogical and biological properties, following this way we can give the soil better use and manage. In addition, we must preserve all the soil in the worldwide, keep with good cover, never naked, so that it reduces its degradation caused by erosion and losses of its productivity capacity. Those good agricultural practices decreases the greenhouse gases and promote carbon sequestration to avoid its liberation to the atmosphere and at the same time reduce the impacts of climate change and warming in our planet.

Taking into account that the soil is a natural body with biological components (organic matter), minerals, air and water with very complex interactions that allow human, animal and plant life (See figure 1 and 2).

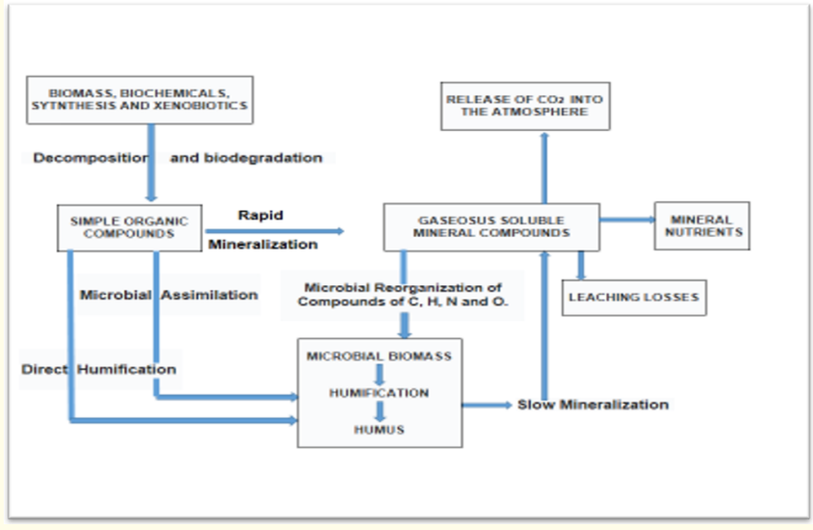

Figure 1: *Stages and interactions of the behavior of organic matter in the soil. (Taken from: La Materia Orgánica del Suelo. Papel de los Micro-organismos. University of Granada, Spain, 2008). Translated and adapted by the author, 2021).*

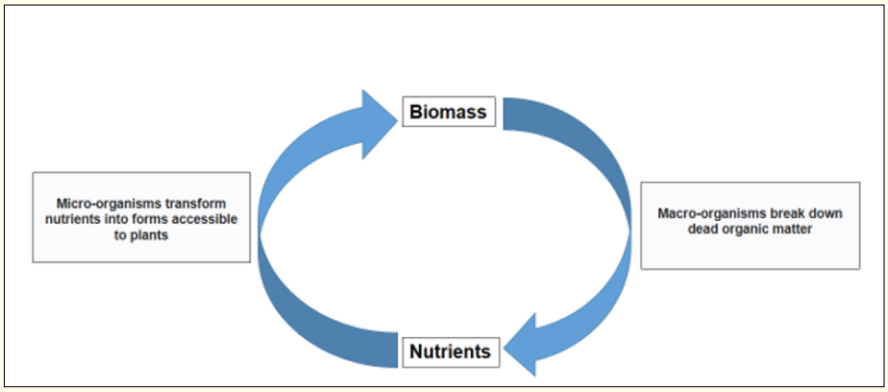

Figure 2: *Importance of organic matter within the biological dinamic of the soils. (Taken from: Agriculture Network Magazine Latinoamérica). Translated and adapted by the author, 2021).*

It's very important to pay attention, to know, to carry out surveys of soils for agricultural purposes, organic matter is the fundamental axis to obtain positive, sustainable and economic responses in crops and livestock farms, while the levels of organic matter remain very low, the soil is progressively degrading and the Yields on the farms mentioned will be any time lower (See figure 1).

In recent times, many scientists in the world have found that one of the very severe limitations of soil fertility is due to the drastic reduction in organic matter levels, as proof of this, experts in these subjects always recommend the application of high amounts of organic matter generally incorporated into the soil with very significant economic responses (See figure 1).

How to comprehensively manage soil fertility?

To focus on a sustainable and comprehensive management of soil fertility, it is imperative to recover, contribute or accumulate a sufficient amount of biomass, avoiding the applications of polluting and destroying synthetic inputs of the soil flora and fauna. The contribution of legumes, green manures, shrubs, trees, crop residues must be re-incorporated into the cultivated lands, seeking to recover the biology of the soil and the improvement of physical and chemical properties, additions of compost from different sources, these components in addition to the contribution of nitrogen and carbon, they maintain the balance of agro-ecosystems. The incorporation of fertilizers of biological origin help to recover the properties of the soils and in turn fertility, since plants can have greater availability of nutrients, favoring their absorption.

Of course, before developing an agricultural project, soil samples should be taken for laboratory analysis for fertility purposes, in order to know the levels of nutrients, their balances, possible limitations due to toxicity of some of them, such as such as sodium, aluminum, in order to apply the appropriate doses of fertilizers and at the appropriate times. Also, to correct the pH values with application of the amendments appropriate.

In the first place, the properties of the soils must be known through serious technical studies, these are the fundamental basis for the proper use and management of soils. The following agricultural practices make it possible to maintain fertility and sustainability in agricultural soils: incorporation of organic matter, minimum tillage or zero tillage depending on the properties of the soils or their physical limitations, crop rotation, maintaining the soil with plant cover or management of weeds, associated crops, green manures, keep some

plots in rest for certain periods seeking natural restoration, avoid or reduce the impacts of erosion through appropriate practices, avoid planting clean crops on very steep slopes, avoid the application of agrochemicals with high toxicological levels, reduce soil contamination, establish the most appropriate crops according to their aptitude, their properties and their potential.

In summary, the presence in adequate quantities of organic matter is the main indicator of the fertility potential and the health of the soil [1-3].

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