Editorial

Soil as a living organism

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Until a few years ago, soil studies have been developed considering almost exclusively the edaphic aspects of it. That is, practices and techniques on the conservation of the structure in terms of its physical constitution and particularly the problem of soil fertility addressed under its chemical aspects; In this way, questions on this subject are considered satisfied by observing the availability of nitrogen, phosphorus, potassium and other elements existing in the soil in conditions to be assimilated by plants.

In the light of current scientific and technical advances it became clear that it is not enough to know only the result of which particular element might be present, but also how these compounds come to be in a condition to be used by plants; and following a logical path how to maintain, modify or increase these availabilities.

However, the elements mentioned in the soil must be almost exclusively in an inorganic state to be used as nutrients; Undoubtedly, the amounts found by chemical analysis of soil would not be enough to maintain plant development on it for more than a few years, in the most favorable cases. As an answer to the question, with respect to how inorganic nutrients come to be found as such permanently in the soil, we obtain it explained based on the microbiological activity that develops there. The microorganisms of the soil are responsible almost entirely for providing through the biological phenomena of decomposition, mineralization, fixation, solubilization, etc. the nutrients in sufficient quantities to be used later in the constitution of the plant mass. That is, the activity of soil microorganisms is related to soil fertility, that is, the availability of nutrients that these soils may present to the needs of the plants that develop in it.[1–5]

It follows from these considerations that, if the development and microbial activity of a soil is hindered or altered adversely for any adverse reason, after a short time its consequences would be reflected in a drastic decrease in agricultural yields. Moreover, after these inferences, it is not risky to affirm that all plant life on the surface of the earth depends to a large extent on the microbial processes that take place in the soil, and following the natural sequences of the biological pyramid we conclude that the survival of the superior beings on the planet, It is conditioned to these microbiological transformations.

From the statements, the magnitude of these assertions is surprising and in order to be able to give a full idea of the real capacity of soil microorganisms, we refer to microbial biomass. This term encompasses in its general meaning the quantity or microbial density expressed in units of weight per gram of soil.

If we refer only to the bacterial population, which are the smallest and most numerous microorganisms that live freely in the soil, we can affirm that the number of bacteria per gram of soil reaches from one million, in poor soils, to several billion in fertile soils.[5–8]

However, on the basis of a cell volume of 1µ3 (one cubic micron) and a cell density only slightly higher than unity (1.04) and the usual generalization that a trillion bacterial cells weighs 1 gram; An estimated direct count of 2 billion bacterial cells per gram of soil is 0.2% of soil weight. This imports about 4,500 kg of live weight or bacterial biomass per hectare considering the 15 cm of the agriculturally useful top layer.

Continuing with these estimates despite the fact that bacteria comfortably outnumber actinomycetes and fungi, the biomass of these is equal and double respectively, which would result in about 4,500 kg of actinomycetes and 9,000 kg of fungal biomass, giving a final figure of approximately 18 tons of living material per hectare, without taking into account mites, insects, lumbricidae and other more evolved beings.

From these considerations follows the extreme potential capacity of biological transformation that a soil possesses, a capacity that man has an obligation not only to maintain but to stimulate. As stated has been titled the soil as a living organism, undoubtedly after the data provided and considering that each of these organisms, fulfill normal vital functions to any living cell, it is concluded that for the soil should be taken the same precautions and care as with a higher living organism.

Thus, all agricultural practices must be oriented to favor or at least not to alter these microbiological aspects to avoid the degradation and erosion of a soil or continuing with the comparisons, its death.

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Conflicts of interest

Authors declare that there is no conflict of interest.

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