

Organic Matter, its Importance in Soil Properties and the Environment

Marco Fidel Romero Zárate*

Agricultural Engineer, Expert in Soil Science and Precision Agriculture, Colombia

***Corresponding Author:** Marco Fidel Romero Zárate, Agricultural Engineer, Expert in Soil Science and Precision Agriculture, Colombia.

Received: July 01, 2020; **Published:** December 30, 2020

With the constant transformation and evolution of today's society, the exodus of the rural population to large urban settlements, accelerated growth of the world population, with the need to produce more and more food, it has been necessary to expand the agricultural frontier to extreme limits, reaching to severely degrade natural resources, including forests, soil, water, fauna, among others.

The current situation of the soil resource is increasingly worrying, due to the problems of degradation by chemical contamination, by mass removal, by severe erosion, by loss of its productive capacity, which has had as one of the main causes the reduction progressive levels of organic matter, starting from its natural state to the large and technified agricultural, agro-industrial processes of the current world.

Organic matter is the basic and fundamental biotic component for the transformation and addition of new materials that improve the properties of soils for their protection and contribution of nutrients to cultivated plants.

Generally, organic matter is made up of residues of organic origin, coming from plants or animals that are incorporated naturally or artificially into the soil resource. Among the main sources of organic matter, the following can be mentioned: crop residues, organic materials from livestock activity (urine, manure, feathers, bones), tree pruning, shrubs and weeds, sawdust, leaves, branches and ashes, pulp of coffee, sugarcane bagasse, waste from industrial and agro-industrial activities, waste from urban activity (Domestic garbage, waste water and faecal materials, prepared organic fertilizers, (compost, manure, bocaschi, earthworm humus, mulch, green manures among many others).

Additionally, organic matter is basically made up of carbon, its abundance and permanence in the soil, in addition to favoring all processes and interactions in the natural environment, significantly reduces the emission of greenhouse gases into the atmosphere, which in turn it helps in mitigating climate change and global warming.

Macro, meso and micro-organisms remain and interact in the organic matter component, these being scientifically accepted as one of the soil-forming factors, too.

With the decomposition of waste and storage of carbon within the biomass of these materials, new structures of this element originate, the micro and macro-organisms fulfill very important functions in the recycling of nutrients, favoring their availability and absorption by plants and in the case of crops improve their yields and in turn productivity.

The organic matter contents of the soils vary significantly depending on the available sources, climatic conditions and their management. For example, in warm tropical climates the rate of mineralization of organic matter is very high, while in cold climates it is very slow and intermediate speeds in temperate tropical climates.

Among the most important processes of the transformation of organic matter we can mention humification and mineralization; the first has to do with all the physical, chemical, and biological processes that transform organic matter into humus. Humus is the most advanced state of decomposition of organic matter, it is considered a colloidal compound of igneous-protein nature, and this compound is responsible for maintaining and improving the physical-chemical properties of the soil.

Mineralization consists of transforming humus into assimilable soluble compounds for plants, it is generally a slow process and favorable conditions and highly specialized organisms are required.

The most important functions of organic matter are as follows: supply of nutrients, such as N, P, K, CO, Fe, Mg, among others, is responsible for the biological activity of the soil, improvements in structure, and in turn of the movement of water and air, favors the development of roots, increased moisture-holding capacity, cationic exchange capacity, increased soil temperature, responsible for potential fertility, pH stability, reduced compaction and soil preparation costs in agricultural production systems and decreased soil erosion process.

The excessive and intensive tillage, the low contributions of materials that contain carbon favor the reduction of the levels of organic matter and as a consequence the degradation of the health of the soil. On the other hand, recovering the organic matter values of the soils is a very expensive and time consuming process.

Therefore, the most convenient way to recover the levels of organic matter in a soil should be through the development of serious projects for the establishment of plants that act as green fertilizers for the soil and in addition to allowing the development of arvenes plants so that later and jointly. They can be incorporated into the soil so that they progressively become integral recovery factors for the soil resource, favoring carbon sequestration in the aggregates.

Stable compounds that constitute organic matter, such as compost, biochar, chicken and pork manures and others are regularly applied in the productive fields, which also help to improve the soil, but they are generally expensive and require large volumes for their positive impact to be greater.

Due to the great importance of organic matter for agro-productive soils and for the environment in general, it is very convenient to develop good agricultural practices for sustainability purposes, some of them are the following: modify and/or reduce tillage preferably according to the geospatial distribution of the main soils, crop rotation, cover crop establishments, application of inoculants and amendments; In the case of livestock farms, over-grazing should be avoided as much as possible, rotation of paddocks, good maintenance of pastures, establishments of silvo-pastoral systems, combination with forage plants, protection of forests associated with water sources among others. All these practices are oriented to comprehensive soil health, these aspects are very important in resilience to the impact of climate change and global warming.

In summary, organic matter is an indicator of the health and productive potential of soils, therefore, to maintain good productions in crops developed in soils with low levels of this component, it is strictly necessary to implement the practices mentioned in the previous paragraphs, incorporation of biomass into the soil plus the application of significant amounts of organic matter in a constant and sustainable way [1-4].

Bibliography

1. CATIE/GTZ/UNIVERSIDAD DE COSTA RICA. Organic Fertilizers Workshop. Sabanilla, Costa Rica (2003): 4-27.
2. Cornell University. Comprehensive Assessment of Soil Health the Cornell Framework. New York (2017): 1-121.
3. FAO. Conservation of Natural Resources for Sustainable Agriculture. Organic Matter and Biological Activity: 2-26.
4. Brechelt A. "Agriculture and environment foundation (FAMA)". Importance of Organic Matter. Santo Domingo Dominican Republic: 2-10.

Volume 7 Issue 1 January 2021

© All rights reserved by Marco Fidel Romero Zárate.