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Short Communication

Short Arguments About Man, Water, Soil and Agriculture

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The Man

In the 3rd century A.S., Thales of Miletus made a statement: everything is water. This can be proven by facts such as: it occupies two thirds of the earth's area; it represents 70% of the mass weight of living beings; it has three states of presentation (solid, liquid, and gas); it is necessary for animal desention and for agricultural cultivation. In the latter, its use as an input in agricultural production has been with humanity since the change of status from nomadic to sedentary, with establishment on the banks of the Tigris and Euphrates rivers in ancient Mesopotamia, in the so-called Lower Mesopotamia (meaning land between rivers), region of the fourth crescent, where the land was fertile, today Iran or Iraq, man has used two natural resources for food production: water and soil [1]. The irrigation process used at that time, occurred through a "rudimentary engineering" that involved the capture of water with the animal leather bag (shaduf), hoisted to the other side of the mountain, where there was the plantation, through a rudimentary structure of "pulleys", where the captured water was discharged.

The human nomandia (hunter-gatherers), ceased after the last glaciation and with it came the need for food production and, all this coincides with the emergence of the Neolithic Period (± 11,000 BC). Not only his own food, but also for the animals (e.g., Equus africanus asinus, Family Equidae) that he began to breed and transport and to help them in their field tasks. With this, he adopts the condition of storing food, building tools for daily life, building cemeteries, among other identifying aspects of sedentarism. Agriculture was also practiced in areas where river floods left fertile soils [2].

In the context of the cradle of civilization, Rome, to, after the Punic Wars, start generating resources for the public treasury of the time. The thought was simple: divide the land into lots, especially those whose limits are not visible, give 125 hectares to families so that they can produce wheat, generate income, and pay the taxes due. However, this did not work, and they had to return these lands to the owners [3].

From this gregarious movement, that is, the coexistence between humans and animals in groups, grazing arises, therefore, more food to produce [4], not only in Mesopotamia, but also in the Nile valley (Egypt), the Indus (Pakistan), the Yellow River (China). In these civilizations the importance of water was so evident that, when managed efficiently and effectively, they prospered and survived, but when this did not occur, it led them to extinction (BRUNI 1993). So, since that time, the sustainable management and rational use of water has shown itself as a tool for the conservation of future generations.

The water

Regarding the movement of water in the soil, which is a porous environment, it acts according to Darcy's Law, i.e., it is always related to the pressure gradient and conductance, or even inversely proportional to the resistance of the medium [5]. This movement can suffer alterations when the water contained in the soil is not in sufficient quantity (matric potential) and available for growing plants [6]. All these aspects indicate that water is indispensable to agriculture from the soil.

As for the parameters of the water of agricultural interest, the hydrogen potential (pH) should always be controlled in relation to the plant to be cultivated; control the presence of solids in suspension, especially in wastewater and water reinserted in the agricultural production process; the minerals such as sodium (Na), potassium (K), calcium (Ca), Magnesium (Mg), active in the formation of chlorophyll; the electrical conductivity that is dependent on the presence of salts and ions in liquid form in this soil [7,8].

Other indispensable parameters for the best application of excellent quality water in agricultural irrigation are the monitoring of coliforms, whether they are total -TC- and/or thermotolerant-TCT. Especially in Brazil, there is a legislation, Resolution No. 357 of the National Council for the Environment - CONAMA [9], which establishes maximum tolerability values for these microorganisms [10]. Another concern with water for irrigation is associated with the good functioning of the central pivot. Water from streams, lakes, artesian or Amazonian wells (cacimbas), where the concentration of sediments is high, or even where the wind tends, during plowing, to displace microparticles into the water body, this may be captured by pressure and obstruct the sprinklers, which could raise the cost of agricultural production [11].

The soil

For the Agricultural sector, soil is the support who's nutritional, air (atmosphere; biodegradation of organic matter; aerobic degradation - carbon dioxide, CO2; anaerobic degradation - methane, CH4) and water (rain, sleet, fog, dew, and melting snow and glaciers) content are fundamental. Regarding the soil, from the conditions of its formation (pedogenesis) from the degradation of rocks by environmental weathering (rain, wind, and temperature), including the biological. It may or may not retain water, and this depends on the concentrations of sand, silt, and clay (soil texture). One thing is true: without water in the subsoil, that is, if it is not available to the plant (relation between field capacity and permanent wilting point), there is no way to promote agriculture. So, the water-soil relationship, for the agricultural process, is vital [12].

The organic matter (OM) in the soil, for agriculture, becomes a storehouse of organic carbon (Corg.), nutrients and energy. It acts on the physical, chemical, and microbiological processes of this environment, including the formation of pores following activities of the edaphic fauna, the growth of roots and fungi, besides the relevance of water retention [13]. At the level of the soil surface, or horizon 0, or even layer A, there is the deposition of the litter, formed by leaf abscission, fruits, branches and twigs, as well as animal waste (e.g., excrement), and others that may be in liquid or solid forms (//C:/Users/anton/Downloads/vdocuments.net_class-03-soil-pollution.pdf).

About the soil chemistry and the contaminants that are deposited in it, either by disposal of pesticide packaging, and metallic particles from the atmosphere, or by leaking lubricating oil, or even the fuel used in agricultural machinery and trucks for transportation, they can either be neutralized by oxidation and reduction processes, hydrolysis (water again). acid-base reactions, precipitations, sorption, chemical and biochemical degradation, as well as can be retained in the non-organic components, this all evaluates the resilience of a soil, and promotes safer and environmentally friendly cultivation [14].

The agriculture

The word agriculture originated from the name of the goddess Ceres (Ker = grow, create). All these data allow us to affirm that plants, regardless of the species they belong to, can grow in the soil due to its physical properties, as well as the movement of water contained therein, which promotes the distribution of capillary water containing nutrients and which is absorbed via the rhizosphere by plants [15]. Another positive factor in the soil-plant relationship is related to the presence of the chemical element silicon (Si) that, when accumulating in the leaves, acts as a defensive against 1. attacks of harmful biological elements (insects, nematodes, and microorganisms); 2. the scarcity of water; 3. salinity [16].

Population growth induces an increase in agricultural production. In tropical areas, precipitation rates vary greatly because the relief, topography, climate, and vegetation change according to the coordinates and hemispheres. This indicates that the use of water for irrigation must be taken care of in terms of quality and its properties (physical, chemical, and microbiological), because if they change, it can affect the health of consumers of agricultural products irrigated with water of dubious quality.

Agriculture is one of the factors that is associated with human development, although in many countries, such as Brazil, this is still neglected. This is because the Food and Nutrition Security

(FNS), considers that everyone should have access to food with quality in the biological order, nutritional health and even technological (SOARES; ROESLER; PELIN, 2021). Brazilian agriculture presents high technology in the agricultural sector that, in addition to safety to environmental conservation because it is of paramount importance to food security.

In Brazil, this sector has been modernized since 1950. In the southeast of Brazil, especially in the state of São Paulo, 10 years later (1960), the production of agricultural machinery and inputs in the factories existing in this region was intensified. In the 1970s, several instruments intensified this modernity throughout Brazil: export tax incentives, research, rural extensions, small currency devaluations, among others [17].

But despite all the modern technology already in activity in the Brazilian field, the use of pesticides is still part of this "technological package", with a justification that the tropical climate prevailing in Brazil, is one of the facts that contribute to the proliferation of pests, and this induces the use of these types of products. But genetic improvement is one of the most modern technologies that agriculture has available, it can generate products with a higher level of resistance to pest attacks, it is still stagnant in Brazilian agricultural production [18].

Despite this technological gap, when compared to other agricultural technological aspects in the world, Brazil presents compatibility with them. This is because agricultural producers have adopted such technologies, especially when they come from the Brazilian Agricultural Research Corporation (EMBRAPA) because these have demonstrated a great capacity to generate a more efficient production as the higher marginal production [19].

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