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MICROBIOLOGICAL, PHYSICAL AND CHEMICAL CONDITIONS OF THE SOIL IN THE SOURCE OF THE CASCAVEL STREAM, GOIÂNIA, GOIÁS

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ABSTRACT

The degradation of forests close to watercourses, riparian or riparian forests, as well as their fragmentation was continuous, resulting from the disorderly expansion of agricultural frontiers, besides the activities of forest exploration, mining, reservoir construction, expansion of Urban and peri-urban areas and industrial pollution. This study identified the pathogenic microorganisms in the soil of the ravine springs in Goiânia, Goiás, as well as, characterized some physical and chemical aspects and the influence of these factors on the soil quality of the springs of the stream. The collections was made in August 2009, in the forest of the springs of Cascavel Stream, in an area of erosion and in a wasteland. Physical, chemical and microbiological analyzes were carried out in the soil. The results of analyzes are inadequate, thus showing a poor quality soil. These factors, together with external problems, such as erosion, Waste streams by residents and others along the banks of the stream also contributed to these negative outcomes, such as pollution and lack of essential elements in preserved natural environments.
KEYWORDS: Cascavel stream, environmental analyzes, soil quality

CONDIÇÕES MICROBIOLÓGICAS, FÍSICAS E QUÍMICAS DO SOL NA FONTE DO CIRCUITO CASCAVEL, GOIÂNIA, GOIÁS

RESUMO

A degradação das matas próximas aos cursos d'água, as matas ciliares ou ripárias, bem como, a sua fragmentação foi continua, sendo fruto da expansão desordenada das fronteiras agrícolas, além das atividades de exploração florestal, garimpo, construção de reservatórios, expansão de áreas urbanas e periurbanas e a poluição

industrial. Este estudo identificou os microrganismos patógenos no solo, das nascentes do córrego cascavel em Goiânia, Goiás, bem como, caracterizou alguns aspectos físicos e químicos e a influência destes fatores na qualidade do solo das nascentes do córrego. As coletas foram feitas em agosto de 2009, na mata das nascentes do Córrego Cascavel, em uma área de erosão e em um terreno baldio. Foram realizadas análises físico, químicas e microbiológicas no solo. Os resultados das análises se apresentam inadequados mostrando assim, um solo com baixa qualidade. Esses fatores aliados aos problemas externos, como a erosão, os resíduos jogados pelos moradores e outros, as margens do córrego, também contribuíram com esses resultados negativos, como a poluição e carência de elementos essenciais a ambientes naturais preservados.
PALAVRAS-CHAVE: Córrego Cascavel, análises ambientais, qualidade do solo

INTRODUCTION

The rapid growth of cities cannot be accompanied at the same pace by the provision of infrastructure to improve the quality of life. There is a deficiency of treated water networks, sewage collection and treatment, street paving, rainwater galleries, leisure areas, green areas and others. In the large cities of the underdeveloped countries, environmental problems are much greater, as well as issues related to pollution of air, water and soil generated by industries and automobiles, there are problems related to the poverty of the poor population, which survives in Poor sanitary conditions and live in groups of population densities in the hills, mangrove swamps, river banks and at risk of the whole nature (ROSS, 1998; CUNHA & BORGES, 2015).

The protection of water sources is of fundamental importance for the maintenance of the quality and / or quantity of a watercourse, since the preservation of ecosystems in the springs of the springs avoiding deforestation, settlements and other human interferences are directly reflect in the Flow of their waters (NOVAES PINTO, 1993; METROPOLE, 2013).

The degradation of forests close to watercourses, riparian or riparian forests and their fragmentation has continued to be the result of the disorderly expansion of agricultural frontiers, besides the activities of forest exploration, mining, reservoir construction, expansion of urban areas and in peripheral areas and industrial pollution. These activities have caused a great increase in the processes of soil erosion, with direct damage to regional hydrology, loss of biodiversity and consequent degradation of large areas (BARBOSA, 2001; RODRIGUES & GALDOLFI, 2001). The contamination of the soil is promote by the addition of compounds that modify their natural characteristics, limiting the use of the soil, endangering the quality of surface water and groundwater and public health (SANT'ANA et al., 2016 b).

The application of compounds to the soil is a factor that besides promoting modifications to the environment entails an imbalance to the ecosystem. The pesticide used, for example, can be transfer to animals and promote deaths as well as potentiate poisoning in masses. The lack of sanitation can be a transport vehicle for pathogens such as bacteria and fungi that cause serious problems (SEMARH, 2009; LIMA et al., 2016).

Goiania's hydrographic network suggests the creation of a linear green system with north-south predominance. Unfortunately, the continuous indiscriminate deforestation, on the banks of the streams and river, the waters are gradually decreasing, increasing the number of diseases, thus contributing to a health situation of concern for the population (IPLAM, 1985). The streams of Goiânia with increasing urbanization have suffered degradation in the quality of the water, since they receive points of discharge of sewage. The banks of the water courses are occupied even within legal preservation areas, for housing without hygiene and security conditions subjecting residents to various types of diseases and the risk of accidents, not only to the sewage and garbage of the riverside inhabitants, but agrochemicals, widely used without criteria in the vegetable gardens, tributaries of some industries and others (MARTINS JÚNIOR, 1996; CUNHA & BORGES, 2015).

Since 1960, according to surveys by the Municipal Planning Department (SEPLAM, 2008; ITCO, 2008), we can observe the subdivision of several houses built very close to the stream and most of it is irregular parceling. Many of these houses are contributing to the siltation, in addition to the inadequate management of many horticulturists along the banks of the well. This is happening as near as to the source of the stream as also along its course. Another problem also very frequent is the existence of solid waste thrown by the residents and other people who see the area as a dumping point of waste and not as an area of great importance to the city (SANT'ANA et al., 2016 b).

According to DORAN & PARKIN (1994) and SANT'ANA (2014), in natural or agricultural ecosystems, soil quality is the capacity that a particular type of soil presents, to perform one or more functions related to sustaining activity, productivity and biological diversity ,maintaining the quality of the environment, promoting the health of plants and animals, and sustaining socio-economic and human-dwelling structures. A balanced soil gives the plant vigorous growth and is able to express its full genetic potential for production.

In this way, several chemical, physical and biological attributes control the processes and aspects related to the modification of soil quality in time and space. It should be emphases that any alteration can directly modify the structure and biological activity and, consequently, fertility, with reflection in the agroecosystems, being able to promote damages to soil quality and crop productivity (BROOKES, 1995; PEREIRA et al., 2016). However, the concepts were renewed and the high quality soil came to be sow in another way. According to VEZZANI et al. (2008), soil quality implications are not restricted only to the soil environment, but extend to the hydrosphere, atmosphere and biosphere, acting on water quality, air quality and biodiversity.

It has been difficult to define and quantify soil quality, since it depends on the intrinsic characteristics of the soil, its interactions with the ecosystem and its use for various purposes (GOEDERT & OLIVEIRA, 2007). The evaluation of this quality by means of soil attributes is quite complex, because of the great diversity of definitions of soil quality itself and why this may also depend on the use of the multidisciplinary interactions between physical, chemical and biological factors that (MELLONI et al., 2008; LIMA et al., 2016). In this paper, we present the results of the analysis of the time and space variables.

The present study aims to identify pathogenic microorganisms in the soil of the ravine springs in Goiânia, Goiás, as well as to characterize some physical and chemical aspects and the influence of these factors on the soil quality of stream springs.

MATERIAL AND METHODS

Study area

The Cascavel stream has its source in Vila Rosa and its outfall in the Anicuns stream, with an approximate extension of 11.5 km. Its main tributary is the Brave Cow Stream, but they also receive the Serrinha and Mingau streams, as their shaping. Anicuns stream, with an approximate extension of 19 km, is the main water course with source located in the Municipality of Goiânia, with its basin practically encompassing the entire urban and urban expansion area on the right bank of the Meia Ponte river.

According to the city's Risk Letter (NASCIMENTO, 1991), regionally the geology is constituted by Archaean rocks (upper than 4 B.A) belonging to the Basal Goiano Complex. In a wide way, on these rocks occur, largely, detritus-lateritic coverings, forming extensive plateau planed by long erosive processes initiated in the Tertiary Period.

The city of Goiânia, according to NASCIMENTO (1991) and ITCO (2008), is located in the contact between metamorphic rocks that were submitter to several thermo-tectonic events, resulting in a structural orientation of the minerals with a gradient from east to west. Rock fractures obey preferred patterns in the northeast-southeast and northwest-southeast directions.

The main municipal geomorphological units are the terraces and fluvial plains of the Meia Ponte basin, the valley bottoms and the Embedded Plateau of Goiânia. The first unit was individual by the river terraces, which are linking to the climatic oscillations of a recent past and by the floodplains, observed in the current drainage lines of the municipality (ITCO, 2008).

The valley bottoms are seasonal units that accompany the drainage of the municipality of Goiânia, where the topographic slopes are accentuate. In addition to the conventional concept of "greater and smaller river bed", the valley bottoms encompass a geomorphological unit, in which the urbanization process in these declining sites its related to deforestation and other forms of disordered production and appropriation of space, often resulting in erosive processes (GOIÂNIA, 2000).

According to NASCIMENTO (1991), the area under study shows the relief of Depressed Plateau. This compartment, marked by land with altitudes of 750 to 800 meters, is located between the highest levels of the Granuli Plateau and the Intermontano Pediplane. It is characterized by mildly (western portion) or moderately (middle-eastern) forms convexed, showing weak to moderate dissection. Dystrophic latosols are predominant, especially at the top of the interfluvial, sometimes replaced by the spodossoles (old classification, the podzolic), mainly in the bottoms of valleys.

Geomorphological units occur in the following altimetry domains: Dissected Plateau of Goiânia with the highest altitudes, from 920-950 m, plateau de Goiânia, from 800-900 m, Plateau Embedded de Goiânia, from 750-800 m, and Terraços e Plains, 700-720 m. The altimetry distribution site under study is 750 -775 m, corresponding to the Plateau Embedded in Goiania (CASSETI, 1992).

Relating the areas of the geomorphological classes to the declivity, we highlight the greatest coincidence in percentage: the Dissected Plateau of Goiânia, with declivity greater than 4%; The plateau of Goiânia and the plateau Embedded of Goiânia, with declivity lower than 7%; The Embedded Plateau of Goiânia, with declivity between 2 and 14%; The Embedded Plateau of Goiânia and the fluvial Terraces with declivity lower than 7%; The fluvial plains with slopes lower than 7%, with the highest relation with the slopes of 0-2%.The valley bottoms with declivities of slopes lower than 14%, with emphasis on the relationship with slopes of 7-14% (CAMPOS et al., 2003; ROMÃO, 2006).In the study area, the slope is 5-10%.

According to the city's Risk Letter (NASCIMENTO, 1991), the soil found in the study area was classified as a Dystrophic Red-Yellow Latosol. It is the largest distribution soil in the region, covering the entire region of the municipality located south of the Anicuns creek and to the west of the Cascavel creek, as well as part of the northeast region, with the municipalities of Goianápolis and Nerópolis, totaling around 40% Of the territory. It is characterized by the varying texture of clayey to medium and chalky and occurrence in areas of flat relief, smooth-wavy, wavy and strong wavy.

According to MENDONÇA (2006) and LIMA, et al. (2016), they are soils in an advanced stage of weathering, very evolved, because of energetic transformations in the constitutive material. They are virtually devoid of primary or secondary minerals less resistant to weathering, and have CTC of the low clay fraction below 17 Cmolc / kg of clay without correction for carbon, allowing variations from predominantly kaolinites' soils, with higher Ki values, around 2.0, assuming a maximum of 2.2, to extremely low Ki oxide soils. They are usually very deep, the *solum* thickness rarely being less than one meter. They are generally strongly acidic, with low base, dystrophic or aluminum saturation. However, soils with medium and even high base saturation occur; usually found in areas with a pronounced dry season, semi-arid or not, or influenced by basic or limestone rocks.

The climate of the study region is of the warm sub humid type (Aw) with two well-defined seasons and significant annual variations in humidity, precipitation and temperature, according to the climatic typology established by KOEPPEN (1918). It presents rainfall from October to March and dry winter from June to September, with transitions between wet and dry periods, and average total precipitation of 1700 mm per year, average temperature of 24ºC and a thermal amplitude of around 15º.

Collection of Samples

The collections were made in August 2009 in the forest (site of the springs of Cascavel stream), in an erosion area and in a wasteland in the morning. The collection locations are in Table 1 and in the location map (Figures 1).The analyzes were physical, chemical and microbiological. The samples for the physical and chemical analysis of the soil were stored in plastic bags and the microbiological samples were carefully collected in sterilized containers, placed in a Styrofoam, to maintain the temperature and taken to the physical-chemical and microbiological laboratory of the Roberto Mange Faculty, Anápolis-Goiás, belonging to SENAI, to be analyzed, regarding the physical parameter (EMBRAPA, 1997) - Particle Density; Chemical parameters (EMBRAPA, 1997) - Active Acidity (pH), Potential Acidity (cmolc / dm^3) (H + Al), Organic Carbon (dag /kg), and exchangeable acidity (cmolc / dm^3 Al^3). Microbiological parameters, microorganisms (fungi and bacteria) were quantified and identified according to MOREIRA & SIQUEIRA, (2006). The presence of fungi / *Aspergillus* sp and bacteria / *Pseudomona* sp, *Escherichia coli*, *Salmonella sp*. (FILIZOLA et al., 2006; FILHO & OLIVEIRA, 2007).

The sampling sites was chosen according to the environmental conditions, showing a stable location, forest area, a site with erosion, anthropic due to the removal of vegetation and lack of correct drainage, and a completely altered environment due to the deposition of waste by residents and others, who use the area as waste disposal space.

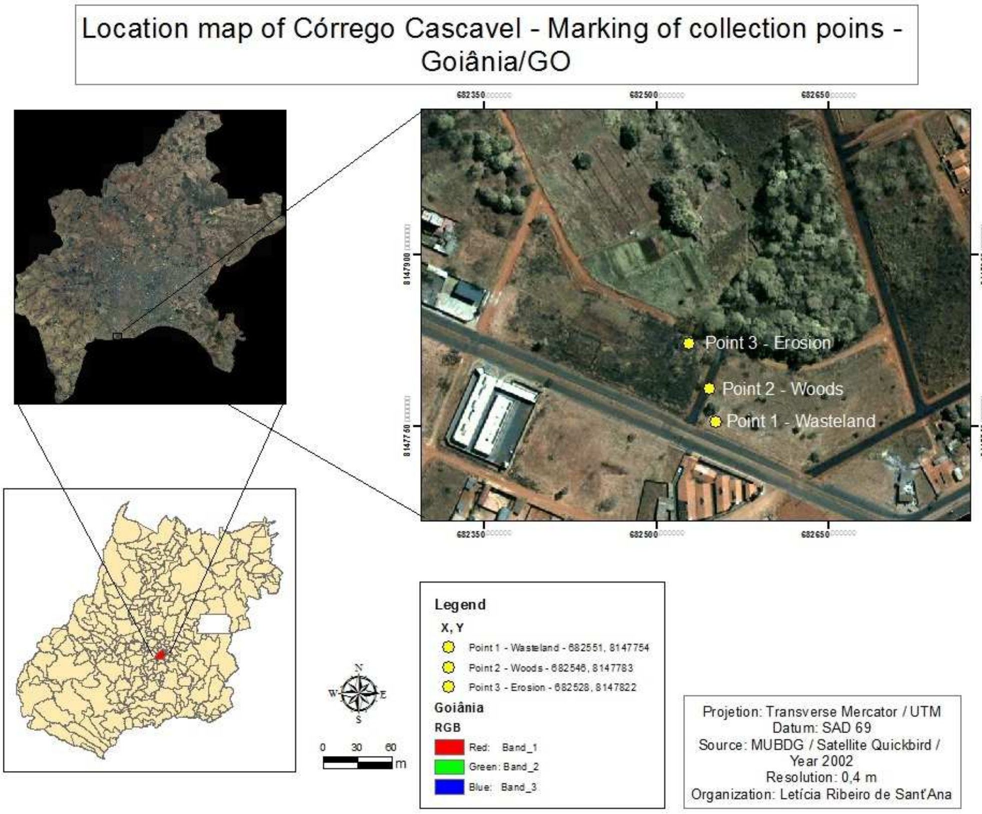

FIGURE 1. Map showing the 3 soil collection points, between the Vila Rosa neighborhood, Jardim Atlântico and Anhanguera Park, in Goiânia-GO in August 2009.

TABLE 1. Geographical coordinates of the soil collection points.

Collection points	Latitude S	Longitude O
Wasteland	16º82'60.2"S	48º14'78.42"O
Forests	16º82'58.3"S	48º14'78.81"O
Erosion	16º82'6.01"S	48º14'78.06"O

RESULTS AND DISCUSSIONS

Physical and chemical analysis of soil

Particle Density

The density of particles is dependent on the chemical composition and crystallographic structure of the mineral particle. The organic matter content of the soil also interferes markedly, mainly in the superficial layers, where the processes that determine its concentration in the soil occur. Soils of organic constitution have densities much lower than the minerals since the organic particles are of little dense nature, rich in pores in their structure. Due to these characteristics, the presence of organic matter tends to decrease the density of the particles of a particular soil, and is the only way to alter this property, since in a short time the nature or proportion do not can be significantly altered of the mineral particles. Increasing iron oxide content tends to increase the soil particle density (BRANDY, 1983; SANT'ANA, 2014).

In soils, the density of particles varies between 2.30 g / cm 3 and 2.90 g / cm^3. Its average value is 2.65 g / cm^3 (VIEIRA et al., 1988; MONTANARI et al., 2011). According to SANTOS (2006), and according to studies by EMBRAPA, the particle density in oxisols varies from 2.59 g / cm^3 to 2.84 g / cm^3 (Figure 2).

According to figure 2, comparing the results with what was mentioned by the authors, it is observed that in the forest area the surface sample presented the values below the expected value, with 2.05 g / cm^3, already at 15 cm the value, is according to the results expected for general soils, according to VIEIRA et al. (1988) and TROEH & THOMPSON (2007), but not for latosol, which varies from 2.59 g / cm^3 to 2.84 g / cm^3. At depth of 30 cm, the value is also in agreement with the soils in general, but does not conform to the characteristics of latosol.

The area with erosion presents the 3 results, surface, 15 cm and 30 cm with respective values 2.23 g / cm^3, 2.19 g / cm^3 and 2.16 g / cm^3. The results are in accordance with the soil characteristics in general, but not with respect to the characteristics of latosol according to SANTOS et al.(2006) (Figure 2).

In the area of the wasteland, they present on the surface, 15 cm and 30 cm the respective values 2.34 g/cm^3, 2.40 g / cm^3 and 2.32 g / cm^3. The values of VIEIRA et al. (1988) and ERNANI (2001), for soils in general, but not according to the characteristics of latosol-type soils (Figure 2) are again verify.

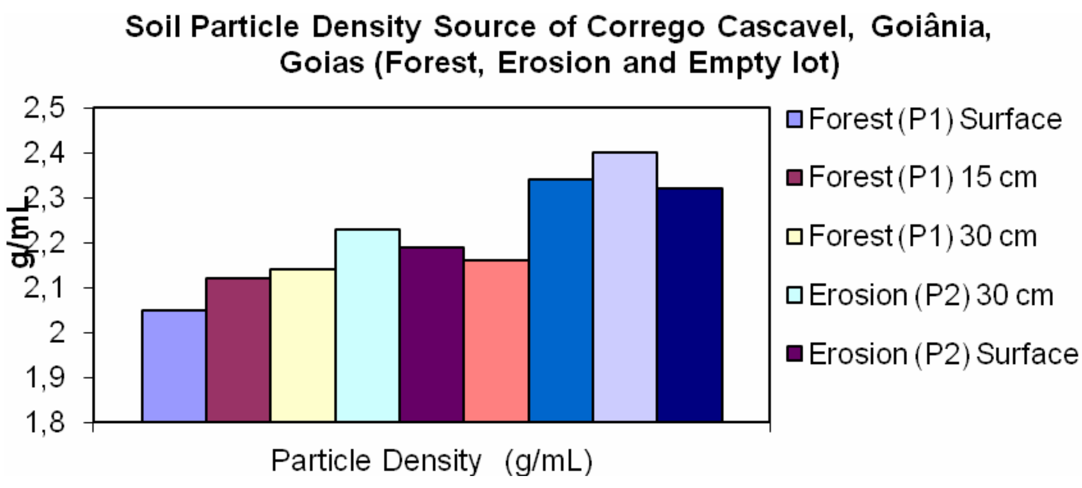

FIGURE 2. Results of the physical analysis of soil particle density in the area of forests, erosion and wasteland, near the headwaters of the Cascavel stream, Goiânia-GO, in the Vila Rosa neighborhood, in the period of August 2009.

Active Acidity (pH) / Potential Acidity / Changeable Acidity

According to BRAGA (1980) and PEREIRA et al. (2016), the soil acidity can vary from 4.0 to 7.5. The soil used for agriculture generally has its pH in the range of 4.0 to 5.5. The progressive acidification that occurs in moist tropical soils is due to the gradual replacement of the Ca, MG, K and Na exchange bases with H and Al ions. This comes because of the accentuated leaching of rainwater, which removes the cations necessary for plant nutrition from these soils, or from the continuous use of acidic fertilizers. Under conditions of high rainfall, the percolation of the water through the profile is quite intense. In this way, large quantities of Ca, Mg, K and Na ions dissolved in the soil solution are remove. Thus, as H+ ions substitute these bases in the colloidal complex (H_30) their acidification is gradually produced (VIEIRA et al., 1988; SANT'ANA et al., 2016 a).

The exchangeable acidity refers to the H^+ and Al^3 ions that are retained in the soil colloid surfaces by electrostatic forces and the amount of exchangeable hydrogen in natural conditions seems to be small (MALAVOLTA, 1976; PEDRO NETO et al., 2008). It is blocking the loads and maintaining a balance with the soil solution. It can be as high as more than 0.2 mol/kg. There is a very large amount of aluminum in the soil, most of which is part of the structure of inorganic colloids. Aluminum complexed by soil organic matter can make up more than 100 times that found in the exchange complex. This aluminum will only be release to the solution if the organic matter is destroy by the microbial attack (RAIJ et al., 1991; LISBOA et al., 2012; PEREIRA et al., 2016).

The degree of acidity of a soil is expressing in terms of pH, which is the concentration of the H^+ ion in the soil solution. The pH value increases as the H^+ concentration decreases. Lime reduces soil acidity by lowering the concentration of H^+ ions, increasing pH and converting a portion of the H + ions into water. The concentration in the soil solution is expressing in pH on a scale ranging from 4.0 to 7.5. However, other types of acidity are former, such as exchangeable acidity that tends to maintain high rates of active acidity. (BRAGA et al., 1980; SANT'ANA et al., 2016 a).

According to figure 3, was observe that the active acidity in the forest on the surface, 15 cm and 30 cm remained close to the expected values - 4.41 / 5.20 / 4.98. In the erosion environment, there was agreement with the expected values - 6.65 / 7.47 / 7.49. In the area of the vacant land there was no agreement, as the values were above expectations - 8,31 / 8,13 / 8,08, a more basic environment, thus being altered.

The potential acidity (H + Al) (Figure 3) was higher in the three wells in the forest environment (28.77 / 27.62 / 31.07). In the environment with erosion, values began to decline in the three cavities - 12.85 / 12.66 / 12.85. In the environment of the wasteland, the concentration is still lower in the three wells also - 9.02 / 10.55 / 11.51. It was notice that the environment of the wasteland presented the greatest change of all and that all the environments much altered present at the concentrations below, noting the degradation. The exchangeable acidity (Figure 3) in the forest environment maintains a concentration up to 0.2 mol / kg, but reduces to zero in environments with erosion and wasteland, thus showing the alteration of the environment in question.

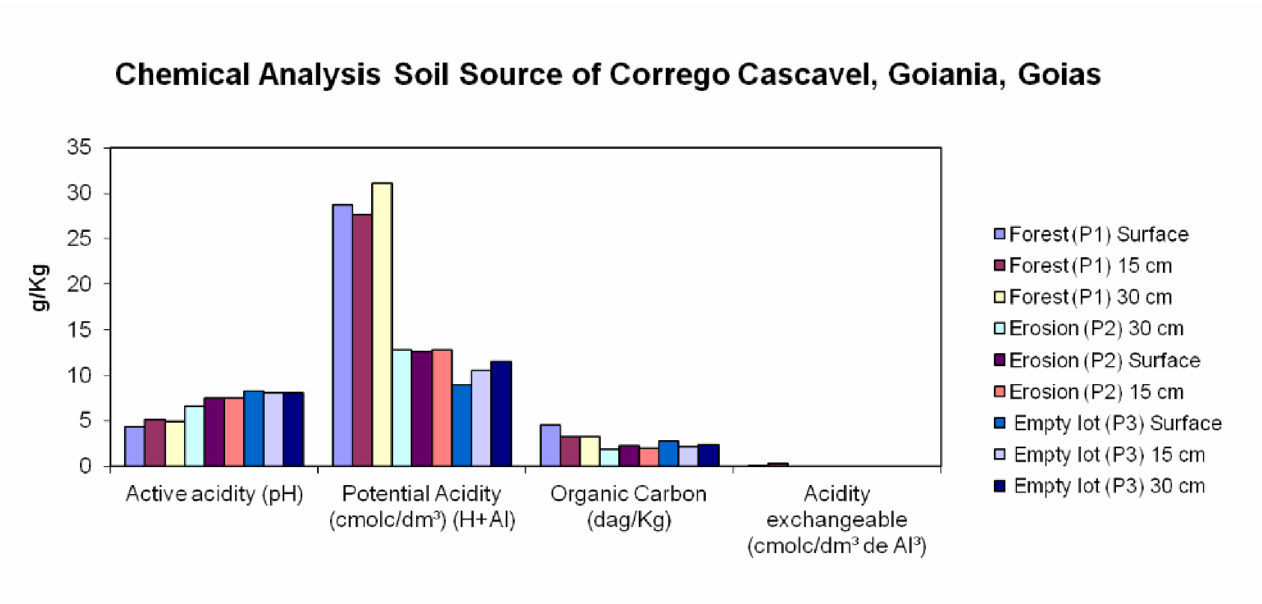

FIGURE 3. The results of the chemical analysis were as follows: active acidity (pH), potential acidity (cmolc / dm3) (H + Al), organic carbon (dag / kg) and exchangeable acidity (cmolc / dm3) wasteland, near the headwaters of the Cascavel stream, Goiânia-GO, in the Vila Rosa neighborhood, in the period of August 2009.

Organic carbon

Carbon is the common component in all-organic matter. Its movement during the microbial digestion of plant tissues is therefore extremely important. Much of the energy acquired by fauna and flora inside the soil comes from the oxidation of carbon. Thus, its oxide undergoes continuous evolution and in great quantities. Failure to properly function would result in disaster for everyone. It is a vital energy cycle for life (BRADY, 1983; SANT'ANA, 2014; PEREIRA et al., 2016).

The concentration of organic carbon (Figure 3) is higher in the surface of the forest area and reduces to three, 25 dag / kg (15 cm) and 1.92 dag / kg (30 cm) in each well. According to as expected, because in the forest the surface, as a function of the litter, greater amount of organic matter would have a higher value and as the degradation of organic matter occurs the carbon will reduce. In the area with erosion presented lower values and did not follow a sequence, the surface presented 1.92 dag / kg, at 15 cm the value was 2.35 dag / kg and at 30 cm it presented the concentration of 1.96 dag / kg. Thus showing an altered concentration as expected in an erosion due to high leaching and little permanence of the organic material in the area.

The wasteland has concentrations close to 2.77 dag / kg (surface area), 2.25 dag / kg (15 cm) and 2.38 (30 cm), thus showing a homogeneous sequence different from the forest area, being an altered environment receives many foreign materials and many are also carried by water or other natural or anthropogenic actions that will alter the expected results.

Microbiological analysis of soil

According to EPA (1985) once added to the soil, pathogenic microorganisms present a variable residence time as a function of the climate and soil conditions. Table 2 shows the survival times in the soil of some types of pathogenic microorganisms.

TABLE 2. Time of survival of pathogens in the soil. Organism Time (days).

Pathogen	Time (days)
Bacteria	30
Virus	30
Protozoa	2
Helminths	30
Cyst of protozoa	2
Helminth eggs	30

Fonte. EPA (1985).

Salmonella is a common bacterium in the intestinal tract, which remains in the environment passing from one animal to another. The main symptoms of salmonella contamination are diarrhea, abdominal pain, fever, headache, malaise, dehydration and chills (FERREIRA & SOUZA, 2000).

Pseudomonas aeruginosa is an extremely versatile Gram-negative bacterium, which can be find in several environments, mainly soil and water, or associated with plants and animals, where it can cause opportunistic infections (GAMA-RODRIGUEZ, 2008). *Escherichia coli* is a Gram-negative bacillus component of normal human intestinal flora and healthy animals, preventing the growth of harmful bacterial species and synthesizing a significant amount of vitamins (FERREIRA & SOUZA, 2000).

Fungi are a simple way of life. With regard to differences, there are those that are extremely harmful to human health, causing numerous illnesses and even intoxication. Several types act on humans causing various diseases, such as mycoses (LACAZ et al., 1970; MENDES et al., 2009).

The concentration of Salmonella in the forest area is different, on the surface a larger number of colony forming units (Figure 4) is find in relation to the other wells, 15 cm and 30 cm. In the area with erosion, there was a higher amount of salmonella in the surface and in the cavity of 30 cm, as shown in Figure 4. In the wasteland due to soil compaction, it was noticed a larger development of the organisms in the surface and little in the other wells of 15 cm and 30 cm.

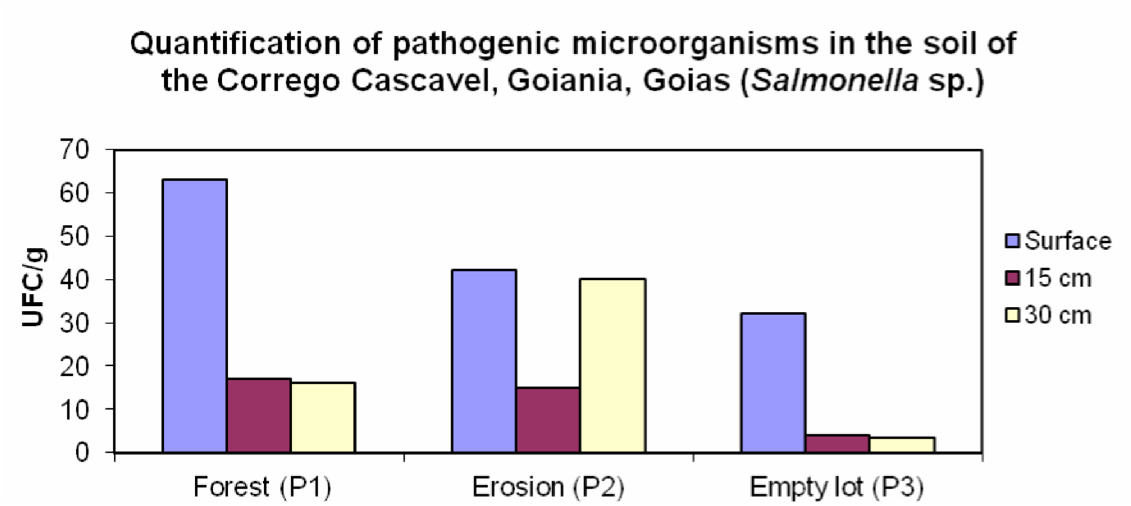

FIGURE 4. Results of the Biological analyzes, in relation to the quantity (Colony forming units - UFC) and presence of Salmonella in the forest area, erosion and wasteland area, near the headwaters of the Cascavel stream, Goiânia-GO, in the Vila Rosa neighborhood, in the period of August 2009.

The Pseudomonas (Figure 5) in the forest area to not appear in any of the samples of the cavities, surface, 15 cm and 30 cm. In the area with erosion, on the surface has 2 UFC, in the sample of 15 cm has 0.3 UFC and in the cavity of 30 cm has 0.7 UFC, it is verified that the highest concentration is found on the surface. The wasteland is the area with the highest concentration of pseudomonas - 15 UFC (surface), 28 UFC (15 cm) and 3 UFC (30 cm).

In figure 6 the amount of *Escherichia coli* is observed. In the forest area, a greater concentration in the cavity of 15 cm was observe, with 70 UFC and the others have 10 UFC on the surface and 8.4 UFC in the cavity of 30 cm. In the area with erosion, a greater amount of pseudomonas was observe in the 15 cm cavity, with 64 UFC, 52 UFC, the surface and 17 UFC at 30 cm. In the vacuous field, the concentration of pseudomonas is higher on the surface, with 45 UFC, followed by 32 UFC in the cavity of 15 cm and 16 UFC in the cavity of 30 cm.

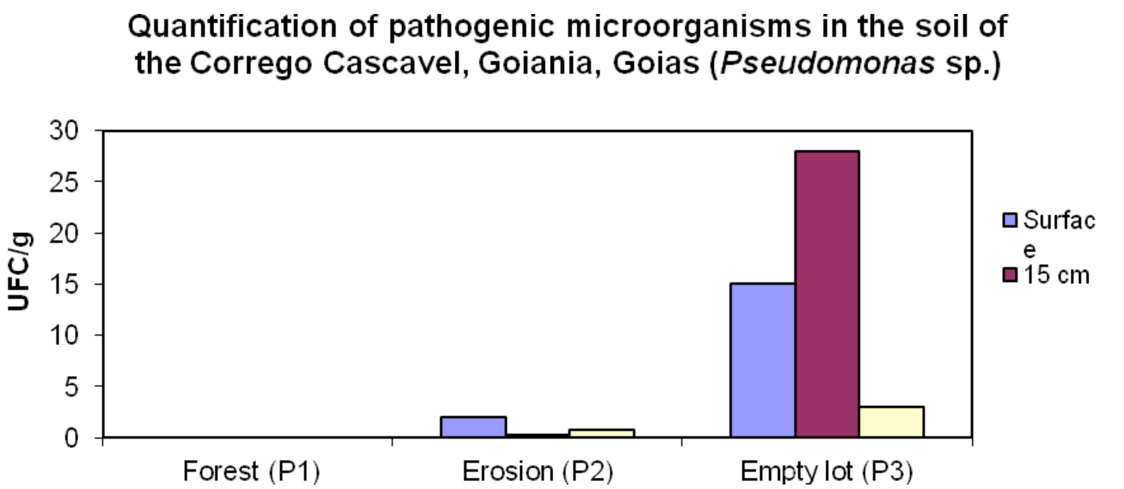

FIGURE 5. Results of the Biological analyzes, in relation to the quantity (Colony forming units - UFC) and presence of Pseudomonas in the forest, erosion and wasteland area, near the headwaters of the Cascavel stream, Goiânia-GO, in the Vila Rosa neighborhood, in the Period of August 2009.

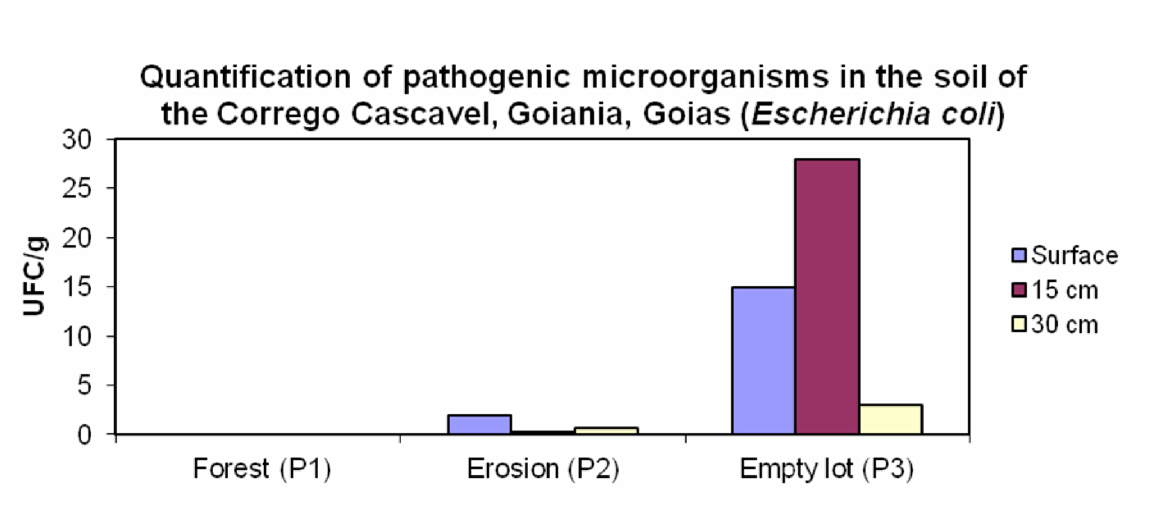

FIGURE 6. Results of the biological analyzes, regarding quantity (colony forming units - UFC) and presence of Escherichia coli in the forest, erosion and wasteland area, near the headwaters of the Cascavel stream, Goiânia-GO, in the Vila Rosa neighborhood, in the Period of August 2009.

Figure 7 shows the concentration of fungi (*Aspergillus sp*) present in the three study areas. It is verify that the greatest quantity of fungi was find in the wasteland area, mainly on the surface. In the forest, area only appears on the surface and in the cavity of 30 cm. In the area with erosion is also present in small quantity.

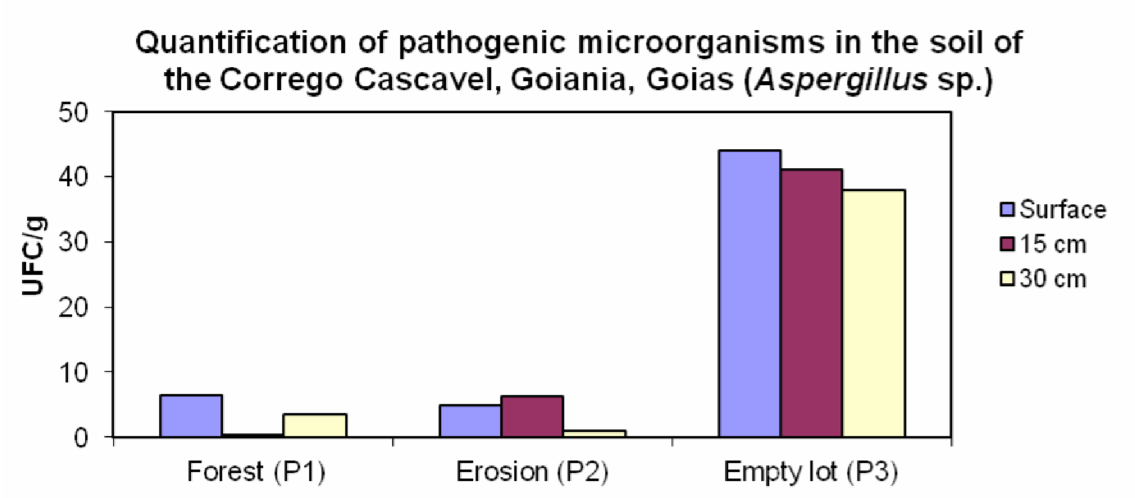

FIGURE 7. Results of the biological analyzes, regarding the amount (colony forming units - UFC) and presence of fungi (Aspergillus sp) in the forest, erosion and wasteland area, near the headwaters of the Cascavel stream, Goiânia-GO, in the Vila Rosa neighborhood, in the Period of August 2009.

CONCLUSIONS

The results of the physical, chemical and microbiological analyzes of the soil are inadequate, thus showing a low quality soil. These factors, combined with external problems such as erosion, waste streams, and other riparian banks, have contributed to these environmental imbalances, such as pollution and lack of essential elements in preserved natural environments. It is also observed that a chemical, physical factor found under exaggerated conditions in the environment, or in minimal quantities show an imbalance, which changes in a certain period due to the increase, of these elements studied or others, that produce an environment conducive to development and sanitary problematic microorganisms, which trigger other problems in the food chain, thus producing a polluted and degraded environment.

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