NUTRITIONAL EVALUATION OF COFFEE SOILS IN THE NORTH SAW OF PUEBLA, MEXICO

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INTRODUCTION

Soils are indispensable in the dynamics of ecosystems and are the ones that sustain food production, their degradation reaches alarming dimensions, increasing in mountainous regions, since limiting natural factors are combined with inadequate agricultural management, presenting nutritional deficiencies in coffee systems. In this context are located the coffee soils of the state of Puebla, Mexico, which occupies the 4th place nationally in coffee production. The objective of this project is to carry out the nutritional status of coffee systems in three areas of the state of Puebla.
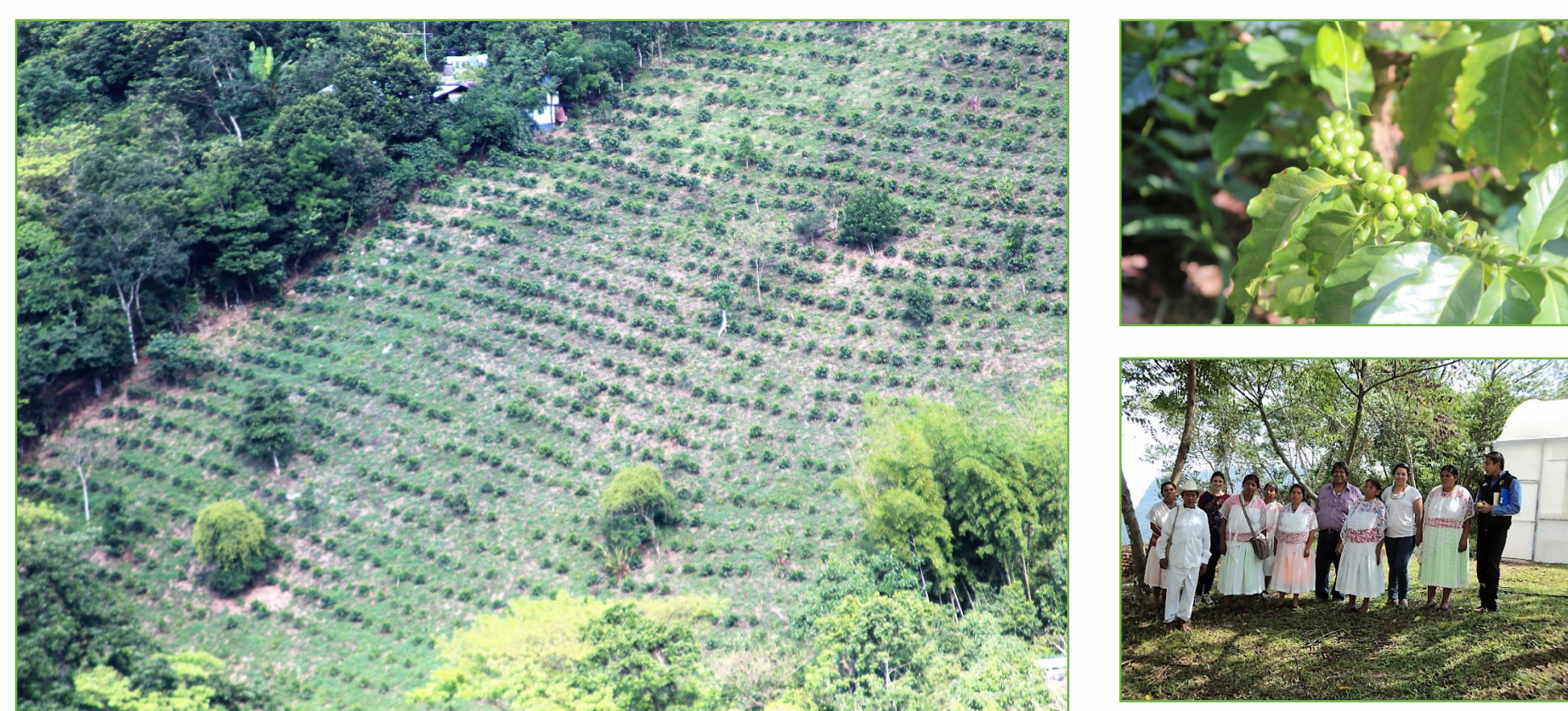
Fig. 1 View of a coffee plot, Sierra Norte de Puebla

METODOLOGY

Selecting 3 municipalities in the northern sierra, 7 in the northeastern sierra and 3 in the sierra negra.30 soil samples (0-30 cm) were collected: pH, CE, Texture, MOS, N, Ca, Mg, K, Na, B, P and CIC and microbiological analysis: bacteria, actinomycetes and fungi, Healthy leaves were collected from the cultures and B, Ca, Cu, Fe, K, Mg, Mn, Na, P and N were determined. The micronutrients evaluated were Cu, Zn, Fe and Mn; in soil by extraction with DTPA by EAA (Varian-AAB55).
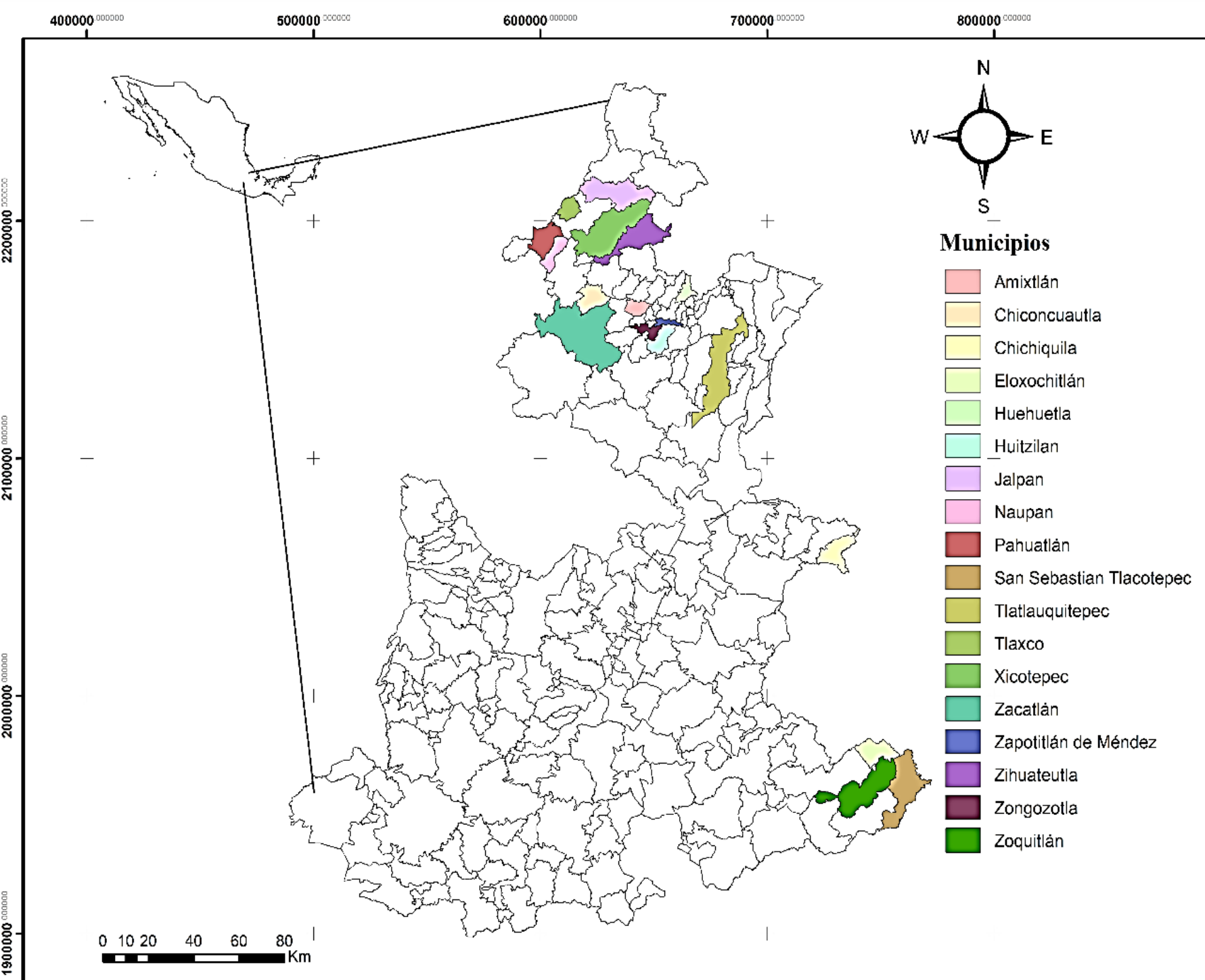
Municipios

Amixtlán
Chiconcuautla
Chichiquila
Eloxochitlán
Huehuetla
Huitzilan
Jalpan
Naupan
Pahuatlán
San Sebastián Tlacotepec
Tlatlauquitepec
Tlaxco
Xicotepec
Zacatlán
Zapotitlán de Méndez
Zihuateutla
Zongozotla
Zoquitlán

Fig. 2 Municipalities in the study area

The soil and plant sampling was carried out in the second semester of 2021.

SOIL CHARACTERIZATION

Tipo de suelo

Alisol
Andosol
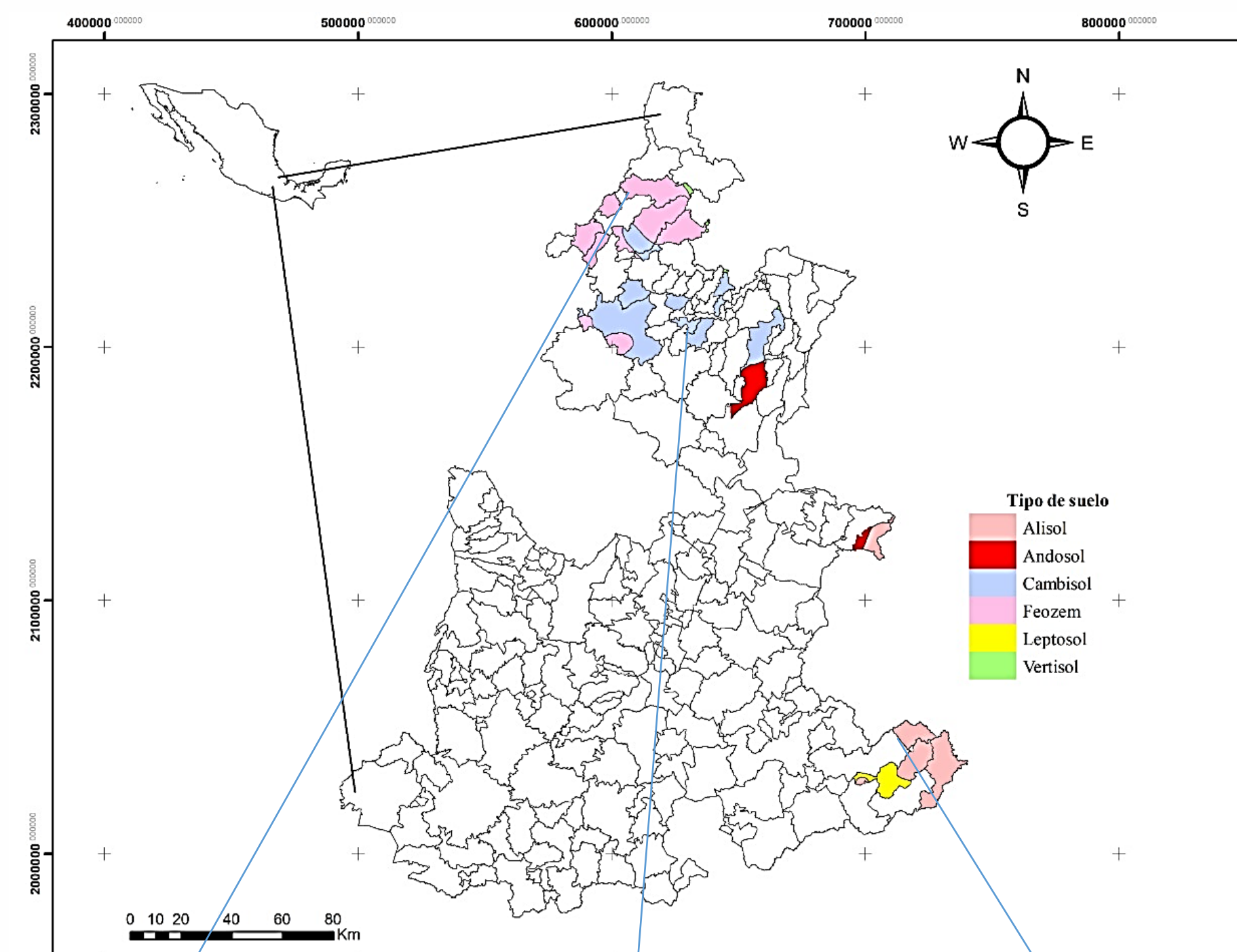Cambisol
Feozem
Leptosol
Vertisol

Fig. 3 Dominant soils of the study area. (WRB, 2015)

Fig. 4 Luvisol characteristic of the Sierra Norte de Puebla

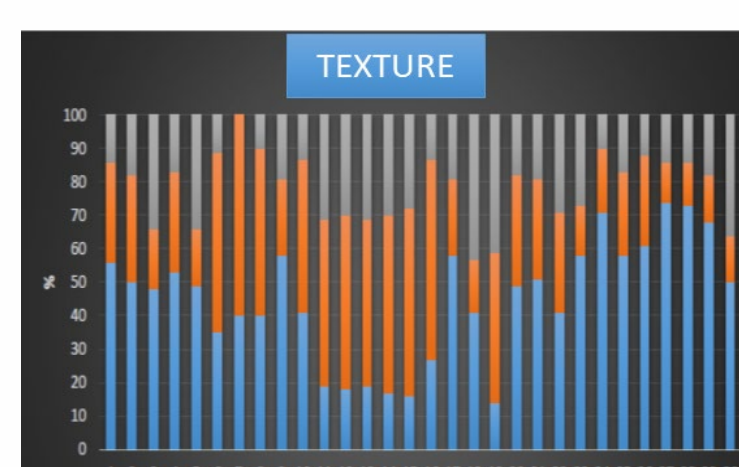Fig. 5 Luvisols with coffee in the Sierra Nororiental de Puebla

Fig. 6 . Luvisol from the Sierra Negra de Puebla

RESULTS

Only the most significant results are presented, that reflect the nutritional status of the soils and is correlated with the leaf content of the crop. Soil analyzes were performed based on the Mexican standard: NOM-021-SEMARNAT-2002.
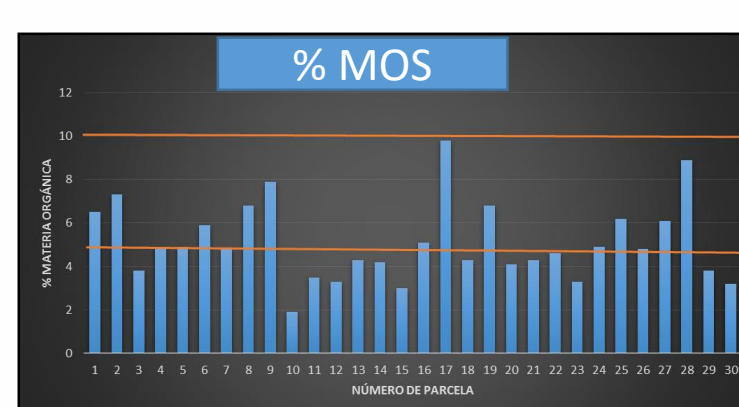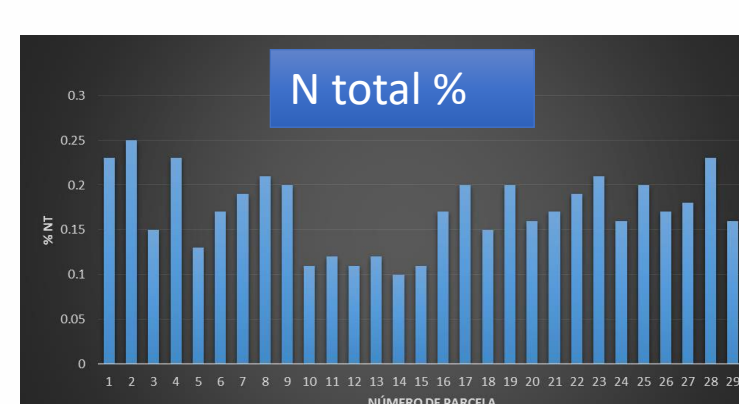
Soils

TEXTURE

The predominant texture was sandy clay loam, which is good for growing coffee.

pH
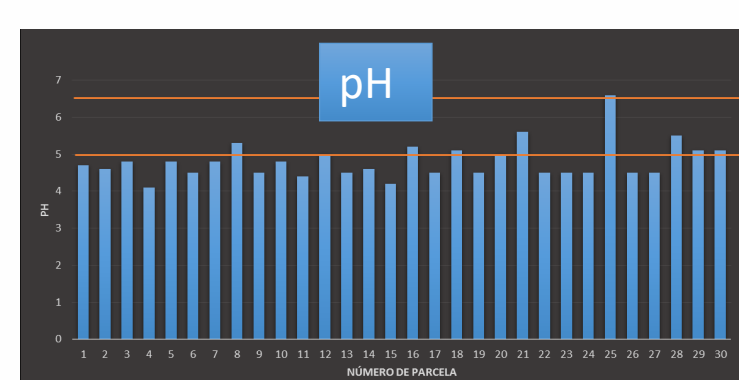
23.3% Strongly Acidic
Average pH: 4.81
Optimum pH for coffee: 5 – 6.5

% MOS

56.6% have low values; 20% are in the lower limit, Average MO: 5.1%. Being an optimal value for coffee between 5 and 10% of MO
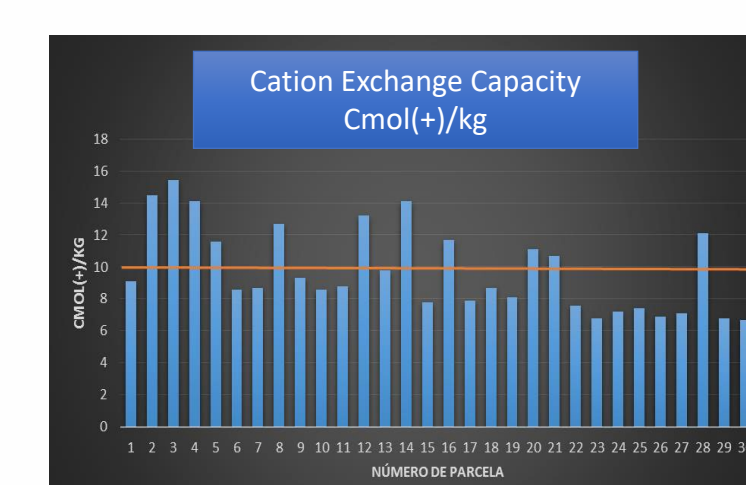
N total %

100% Plots with very low values
Average Nt: 0.17%
Nt the optimal values for coffee are: 0.4 - 0.8%

Available Phosphorus mg/kg
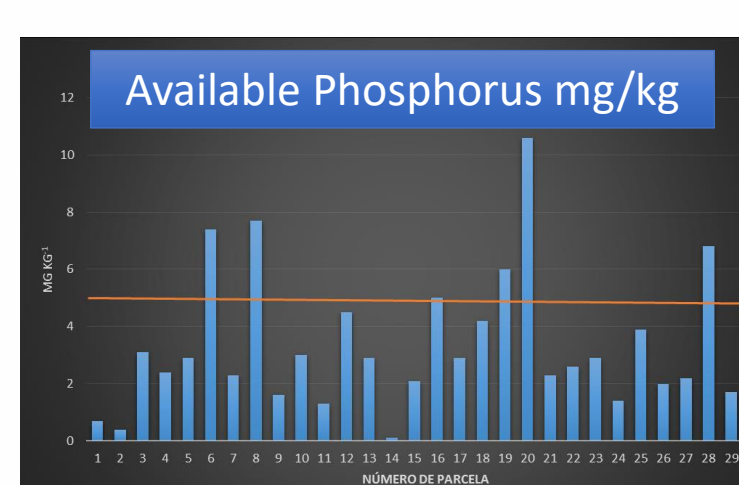
20% Has acceptable values
Average available P: 3.31 mg Kg-1
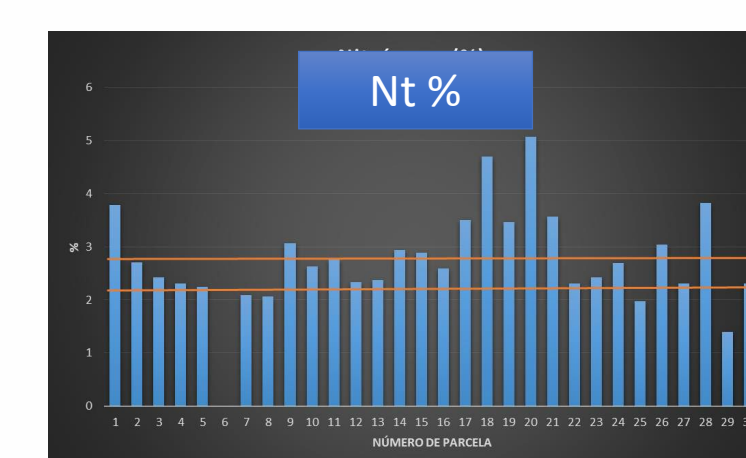P available optimal value for coffee: 5 – 15 (mg Kg-1)
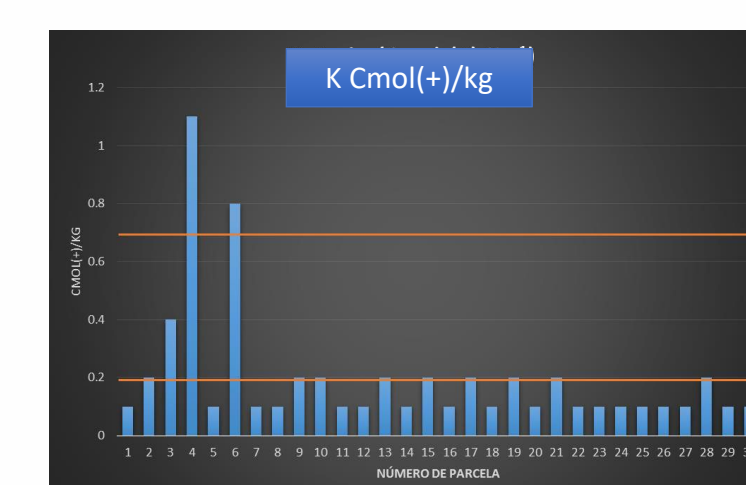
K Cmol(+)/kg

10% Has acceptable values
Average K:
0.19 (Cmol (+) Kg-1)
K Optimal value for coffee:
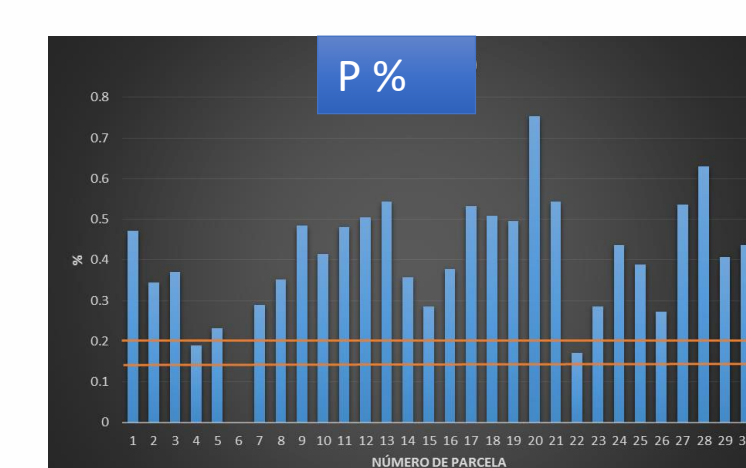0.2 – 0.7 (Cmol (+) Kg-1)

Cation Exchange Capacity Cmol(+)/kg

Average CEC of the samples:
9.77 (Cmol (+) /kg
36.6% of the values are optimal
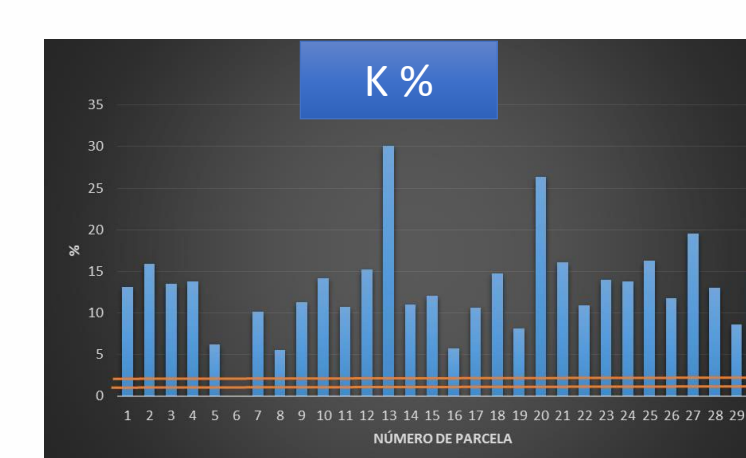CEC OPTIMAL VALUE FOR COFFEE:
10 – 20 (Cmol (+)/K

Leaf tissue

Nt %

34.4% of the sample presents Excess, the
27.58% deficit
this difference is due to the fact that some crops received foliar fertilization

P %

93.10% of the samples presented Excess, average P: 0.41 (%). the excess was due to foliar fertilization

K %

The total of the samples presented values in Excess, the average was 13.31%

CONCLUSIONS

- Fertility as an emergent property is in a low to medium category. The study requires collecting complete data on the agronomic management of the soil, such as: planting density, type of shade, fertilization history, relief, among others.
- The pH values present strongly acid values (NOM-021-RECNAT-2000), for which it is necessary to carry out the liming of the soils.
- The MOS contents, according to the NOM ranges, are high. However, for coffee cultivation, concentrations of 7 to 10% are recommended, so the soils analyzed are below these requirements. The addition of organic matter is important
- 5 The (CEC) shows low values in the soils, which hinders the availability of nutrients to the crop, the addition of MOS would increase.
- The foliar analysis shows correspondence with the fertility status of the soils, however, the effect of foliar fertilization was present

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