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Cluster and discriminant analysis of agricultural soils from Manica province in Mozambique

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Five samples soils from agricultural farms of Manica province (Mozambique), two of Manica and three of Sussundenga district, were collected by random sampling. The random sampling was done in a zigzag manner in a four years period, from 2021 to 2024 - a total of fifteen samples, five per farm in three campains, were collected [1,2].

Twenty-seven physical-chemical parameters were analysed for all the samples: extractable ions (K, Mg, Ca, Fe, Mg, Zn, Cu and B), exchangeable ions (Na, K, Ca, Mg and Al), cation exchange capacity (CEC), fertility properties of soils (total limestone, active limestone, pHH2O, pHKCl, extractable P, organic carbon, organic matter, N total, N nitrate, conductivity) and texture (sand, clay and slit) [2].

A multivariate analysis design was used to classify the soil samples under research. Cluster analysis (hierarchical and a non-hierarchical K means) was performed in order to evaluate the similitude of the soil samples and the statistically significant variables that contribute to the variability of the model. Also, a two-step cluster and discriminant analysis were performed in order to further explore the results of the initial cluster analysis [3,4].

The non-standardized hierarchical cluster analysis for the five samples at each sampling time resulted in a two-cluster model and for the all the fifteen soil samples along the time a three-cluster model. By a non-hierarchical K means cluster analysis the more stable model, for the five samples at each sampling time, was found with the two clusters model and, for all the fifteen samples along the time, was found for the three-cluster model. The two-step cluster analysis confirmed these previous results. The more and the less important predictor found for each of the five samples for the three sampling times is not the same. For all the fifteen samples the more important predictor found with is the extractable K and the less important predictor is the N nitrate. The discriminant analysis confirms the previous cluster models for the five samples at each sampling time and for all the fifteen samples along the time.

Type of presentation

Poster

Primary authors: Prof. LEITÃO, João (University of Coimbra - Pharmacy Faculty); Prof. ESTEVES DA SILVA, Joaquim (Chemistry Research Unit (CIQUP), Institute of Molecular Sciences (IMS), DGAOT); Dr PEREIRA, Mário (Chemistry Research Unit (CIQUP), Institute of Molecular Sciences (IMS), DGAOT)

Presenter: Prof. LEITÃO, João (University of Coimbra - Pharmacy Faculty)

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