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P188. The effect of number of increments in a composite soil for representativeness of a decision unit

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The purpose of incremental soil sampling for investigation of contaminated sites is to obtain an accurate mean of an area (DU) to support decisions for soil management actions. Therefore representativeness of the sample corresponding to each DU – decision unit is crucial to avoid unexpected expenditure on resampling and reanalysis. In order to achieve it, potential errors as described earlier by Pierre Gy should be avoided. This implies not only in using of correct sampling plan design and protocols (including appropriate handling, preservation and transport) and analytical methodologies but also collecting a sufficient number of increments with adequate mass and reduced size of particles (< 2mm).

This study evaluated the effect of number of aliquots in the representativeness of a composite surficial soil sample result from four different DU of 400-600 m^2, located in Minas Gerais state, Brazil.

The number of aliquots in the composite samples varied from thirty to ninety increments. They were collected in each UD for total determination of elements (Al, As, Ba, B, Cd, Pb, Co, Fe, Mn, Ni, Se, V, Cu, P, Zn) and anions (fluoride and nitrate). Firstly samples were air dried and sieved at laboratory to remove particles larger than 2 mm. The processed samples were then subsampled using a sectorial splitter and submitted to analytical procedures (ICP-OES and IC, according to SW 846 US EPA). All analyses were carried out in a laboratory ISO 17025 accredited for all parameters.

Samples composed of 30 aliquots were analyzed in triplicate. Relative standard deviation (RSD) among triplicates varied from 0 to 23%. This good agreement between the samples indicates an appropriate sampling design.

Thirty increment samples results were also compared to 60-90 aliquots samples applying linear regression analysis, with 95% of significance level (p<0.05). The results ranged from 0.9925 to 0.9999, showing no statistical difference between samples from the same DU.

The obtained results in this study demonstrate coherence with Gy theory, which indicates that a minimum of 30 increments is necessary to obtain representativeness of a decision unit. This conclusion cannot be extended and generalized to all contaminants. In order to achieve the low levels required for organic compounds investigations a more complex analytical methodology is applied which is subjected to a major deviation compared to inorganic determinations.

Keywords: multi increment sampling, soil characterization, representativeness of a decision unit, number of increments.