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A Standard Operating Procedure (SOP) for Forensic Soil Analysis: Tested Using a Simulated Crime Scene

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Abstract : Soil traces are useful as forensic evidence due to their potential to transfer and adhere to different types of surfaces on a range of objects or persons. The great variability expressed by soil physical, chemical, biological and mineralogical properties show soil traces as complex mixtures. Soils are continuous and variable, no two soil samples being indistinguishable, nevertheless, the complexity of soil characteristics can provide powerful evidence for comparative forensic purposes. This work aimed to establish a Standard Operating Procedure (SOP) for forensic soil analysis in Brazil. We carried out a simulated crime scene with double blind sampling to calibrate the sampling procedures. Samples were collected at a range of locations covering a range of soil types found in South of Brazil: Santa Candida and Boa Vista, neighbourhoods from Curitiba (State of Parana) and in Guarani and Guaraituba, neighbourhoods from Colombo (Curitiba Metropolitan Region). A previously validated sequential analyses of chemical, physical and mineralogical analyses was developed in around 2 g of soil. The suggested SOP and the sequential range of analyses were effective in grouping the samples from the same place and from the same parent material together, as well as successfully discriminated samples from different locations and originated from different rocks. In addition, modifications to the sample treatment and analytical protocol can be made depending on the context of the forensic work.

Keywords : clay mineralogy, forensic soils analysis, sequential analyses, kaolinite, gibbsite
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