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Study on subsoil profile analysis at Lamae district municipality ground, Chumphon city, Thailand by atomic absorption spectroscopy for forensic application

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Soil is an important physical evidence used in crime investigation. It is a trace evidence found in shoes, shirts, head hairs, vehicle tyres, transferred from the crime site. Soil is a mixture of multi-minerals, plant materials, animal matters and tiny man-made materials like paint chips, glass pieces, concrete materials, oil stains and many more. Soil is composed of small particles and these particles vary in size, shape and chemical composition. Three types of soil particles are known viz. sand, silt and clay. Soil texture is determined by the relative amounts of sand, silt and clay in the soil. The combination of soil mixture makes it distinct and thus vary from one site to another. Even the color of soil vary from one place to another since color is an indicator of the chemical and physical characteristics of soils. The metal ion concentration plays a vital role for soil comparison. Similar to top soils, subsoil samples also show variation in density, pH and metal ion concentration. Comparison of soil trace is an important component to identify and link the primary and secondary crime scenes. Therefore, forensic scientists are interested in subsoil analysis for forensic application. The objective of this research was to analyse the subsoil profiles. Three soil samples each (500 g) were collected at three different points in the same ground, viz. top soil, soil at the depth of 15 cm, and 30 cm from a total of 9 soil samples from Lamae district municipality ground, Chumphon town, Southern Thailand and preserved. The color of the soil was noted by using Munsell color chart and pH of the soil samples were identified using pH paper. Atomic Absorption Spectroscopy (AAS) was used to determine the metal ions concentration of potassium, sodium, calcium, iron, lead, copper, chromium and cadmium from soil samples collected from different points and depths. Soil samples in point S1 showed that potassium metal ion concentration at 5.72 mg/kg in top soil sample, 11.64 mg/kg in 15 cm subsoil and 7.23 mg/kg in 30 cm subsoil and show sub profile variation at the same point. Similar variations were observed in other metal ion concentrations. The results show that no two soil samples are same and all soil samples varied both physically and chemically. Hence, it is concluded that this method of soil analysis can be used for forensic application.

Keywords: AAS, evidence, Chumphon, forensic science, subsoil profile, Thailand