

Analysis of Soil in Crime Cases and Its Importance: Cases Study

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Abstract

Soil from the scene of occurrence, can give us the major evidence and relevant information, so it is admissible in court. As it can be used as important and relevant evidence, as it follows the Locard's Principle. On the basis of quantitative and qualitative analysis, it can easily be revealed to trace out the primary scene of occurrence and secondary scene of occurrence. As well as soil may also provide an important clue regarding to the connection of the victim, suspect in the happening or committing crime. In the criminal offences which can be found in soil by different samples such as footprints, fingerprints, hair, fiber, blood, bullet, knives, bodily fluids, guns, paints and many other points and various substance from soil which will help us to link a suspect to the crime scenes. Through the three cases studies, we elaborated the importance of soil and its evidential value in crime solving and get a proper direction of investigation.

Keywords: Soil; Physical evidence; Primary and secondary crime scene; Crime scene investigation

Introduction

Soils are complex combinations of nutrients, freshwater, oxygen, organic materials, and innumerable creatures that are the decomposing remnants of once-living species. The organization of sand grains into tiny clumps, known as peds or aggregate, is known as soil structure. Physical, Chemical and Biological properties of soils provides loss of information regarding to area and location [1,2]. Forensic soil science and the use of soil science, particularly investigations involving soil morphology, soil mapping (aided by soil texture maps and spatially stored soil data), minerals, chemistry, geophysics, science, and cell biology to solve legal issues, problems, or theories [3]. The various soil practice of pedology (out from Greek Pedon = soil) is primarily important in order to understand the diverse range of soil types and their circulation and is most clearly specified on important questions troubling sampling, representations, and processes of soil development, including performance, extent, distribution, spatial variability, and analysis of soils at micrometer to value that is greater scales [4,5]. When investigating scene of the crime or examining evidence, soil components discovered and gathered with hand lens or light microscopes. To guarantee that soil samples can be relevant during an investigation, they must be carefully gathered and handled using recognized collection procedures, and then evaluated, ideally by a soil researcher with forensic science knowledge. Sieve analysis, electromagnetic recovery, and heavy mineral isolation are some of the usual procedures for quickly separating and concentrating soil components or particles. Because of its origin as the ground's surface, soil can reveal important information regarding people's links to crime. Soil's evidentiary value is based on its wide range of features [6,7].

Methodology of Analysis

Forensic soil examination is utilized in the investigation of crimes such as hit-and-run accidents, automobile crashes, rapes, and burglaries to link the suspect or an object to the crime site [8,9]. A comparison of soil picked up by a car tire with soil sampled from the crime scene, for example, may aid in proving that the suspect vehicle was utilized in the crime. Similarly, silt or mud adhered to a person's clothing or shoes may provide a clue that can link a suspect to a specific murder scene. Because of the impacts of wind, water, living organisms, mining, and agriculture, soil is highly diverse in nature and varies widely from place to place, and the forensic laboratory has little or no control over the quality and quantity of the specimens received [10]. The goal of forensic soil analysis and comparison is to look for significant differences between samples. There are virtually always differences between samples. The purpose of a forensic examination is to show which distinctions are important. The absence of significant distinctions at the end of an analysis is seen as proof of shared origin. In most cases, the analysis begins with the most basic nondestructive testing available for the circumstances. If the initial tests fail to distinguish between the samples, the investigation will move on to subsequent tests that may involve a greater amount of sample preparation or consumption and are chosen depending on sample availability and the tests' capacity to discriminate between the samples. The SOP for soil examination has been done as described in the Manual of DFS, New Delhi for Forensic Physics [11]. Once enough tests have been done, a conclusion based on the comparison of soil samples may be obtained. The number of tests required varies depending on the question, and it is up to the examiner to decide when the analysis may be completed.

Case Study

Case I: Murder of wife by her husband

Case history: One dead was taken in a tractor trolley by a male, Police caught him, and asked relevant question from the person. He was not able to reply accordingly, police call forensic team for crime scene investigations.



Figure 1: Dead body of the victim adhered soil on the body.

Crime scene team finding: When police called forensic expert visited the scene, the dead body of the victim was adhered with large amount of soil. We suggested policing for search an area, where the dead body might have been hide. After that, we visited the house of the victim and suspect; we found the space where the dead body was hidden. As shown in Figure 1&2.



Figure 2: A fresh soil removed about 3 feet dip hole in the room floor.

Laboratory examination: The soil of the victim's body and soil of the victim's house where her dead body was hidden sent for examinations. Our laboratory revealed that the soil collected from the Victim's body belongs to the soil of the area where she was hidden.

Results: At the spot, police trap the person and he after investigation accepted to commit the crime for hiding his illicit relation with another woman, she was an obstacle for him. So, he murdered her.

Case II: Tried to hide evidence and secondary crime spot

Case history: One male dead was found near a railway track Police reached and consider it in under 174 CrPC, medical jurist team done autopsy and postmortem. After postmortem, we have been called. We searched the place and photos of the dead body, we found that the body was not wearing any upper clothes.

Crime scene team finding: we suggested this spot is not the primary scene of occurrence, we visited the spot after next day, we found some tire tread pattern near the premises near the railway track where dead body found. After that we visited the victim's house and nearby places. We found some drag pattern, which directed where the crime was committed, some torn clothes (baniyan "briefs" and soil smeared torn shirts), which might belong to the victim. We suggested police officer for sending the clothes for analysis. After our suggestion police started searching the person behind, the case was solved.

Laboratory examination: The soil of the victim's body, soil house and torn clothes of the suspect location where drag pattern were sent for examinations. Our laboratory revealed that the soil collected from the Victim's body, House and torn clothes were similar.

Results: The investigation officer, worked very hard the case was solved; the person behind the crime was only his elder brother, who wish to occupy all properties of their forefathers.

Case III: Suspect vehicle and soil of scene of crime

Case history: It was a very simple crime scene in the police point of view; the investigating agency traced a smuggler from the border area of Rajasthan and Madhya Pradesh. They file an FIR against the person who was travelling the motorcycle from MP to Rajasthan. The case was registered under NDPS Act.

Crime scene team finding: we had been called to apply pre-test on the suspect material trace by police. The statement of the suspect person was that I am coming from School, which in Rajasthan. So, after applying the pre-test, we check the soil in the tire ridges, and send the soil was send for laboratory examination. Prima fascia, we ruled out the police theory, the vehicle was coming from the border state, as the Tower Location and CDR also add to our theory.

Laboratory examination: When the soil examined collected from the area where the suspect person coming from and soil recovered from the tire, found similar, which support our prima fascia report.

Results: The case was closed after the lab report.

Discussion

The methods result analysis in forensic science is a comparison of soil specimens based on soil texture, colour, and grain size. The diverse nature of density, particle size, or variance in the soil itself soil changes as a result of weathering and climate variations makes the earth one-of-a-kind formation of soil. The microscopic characters of the fine particles are also examined as suggested

in manuals and literatures [10,11]. For most objective of the forensic soil analyzes related to crime are to ascertain whether or not the two sets of samples originated from a common location. Furthermore, soil analysis' utility in forensic investigations and casework has been established. It is envisaged that this study will help to strengthen and promote the use of soil analysis in forensic science to reveal the truth behind the crime and in the investigation purposes.

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