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Secondary Metabolites of Industrial Applications (Wine, Confectionery, Tea Industry, Cosmetics, etc.): Detection of Truffes by Ground Penetrating Radar

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In recent years, Ground Penetration Radar (GPR) is a relatively modern and effective and widely utilized technique for shallow subsurface exploration. The GPR technique was used to study the two-dimensional distribution of truffles on roots of oak trees in dry sediment soil and weathered limestone. We used A RAMAC system at 0.05 m intervals, and a signal frequency of 250 MHz for this study for showing the places of truffes on the researching profiles in the study area. To evaluate the efficiency of the GPR in the detection of truffes, this technique was tested on unknown area in the forest of Honaz mountain and a controlled study involving truffes that were buried at known depths. Honaz Mountain (Denizli-SW Turkey) has a mild and humid climate and it produces a rich flora in the area. As a natural consequence thereof, the study area offers a rich mushroom potential that is a rising economic value. A large number of mushroom grooving areas have been detected during the study. The observed GPR data have been confirmed by the physical excavation. The study proposes that this method can be effectively employed to detect the natural mushrooms in the ground.

The GPR was also tested for its ability to map position and types of the truffes underground in the field. We purposed that this study further confirmed that only truffes with diameters greater than 4 cm were detected by the GPR system. On the other hand, the formation of other roots bodies and their presence in soil might produce an anomaly in the soil, particularly at the interface between soil and truffle. To elucidate how the mushroom can reflect the signals, mineral composition of the mushrooms has been analysed. We showed that the percentages of K, Na, Ca, Mg, Fe, Al, P, S, Si, Cl minerals were significantly different from that of earth. This difference in element composition seems to cause the reflection of the signals. We can see on the GPR sections the truffles in the soil after they have enlarged to at least 4 mm in diameter.

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