Abstract stage 1 (2025)

Stage 1 of the project included 4 activities: ► ***A1.1 Development and calibration of Raman spectroscopy parameters for the specific detection of adulteration in olive oil. Visit of the Turkish team to the Romanian partner,*** during which Raman spectroscopy was evaluated for the specific detection of adulteration in olive oil. A description of olive oil, its chemical composition, as well as the Raman spectroscopy method was provided. The Raman method was developed, including the selection of wavelength, the establishment of acquisition conditions, as well as the integration of machine learning for spectrum classification and testing on real data sets. During the period 16.11–21.11.2025, Dr. Didar Sevim (project leader), Dr. Oya Koseoglu, Dr. Ayla Mumcu, and Dr. Hulya Kaya carried out a working visit to INCDO-INOE 2000, ICIA Cluj-Napoca branch. The partners from Turkey brought samples of extra virgin olive oil that had been adulterated with sunflower oil. The samples were subjected to analysis by Raman spectroscopy. ►***A1.2 Testing and optimization of measurement conditions to maximize the sensitivity and specificity of the method. Visit of the Romanian team to the Turkish partner.*** A work plan was developed for optimizing Raman testing in the detection of olive oil adulteration, which includes: the objective, the required samples, sample preparation, selection of the instrumental configuration, the use of machine learning algorithms, and the evaluation of the method's performance. During the period 06.10–11.10.2025, three Romanian researchers from the project implementation team from INCDO-INOE 2000 – ICIA Cluj-Napoca Branch – Dr. Lăcrimioara Șenilă, project director from the Romanian side, Dr. Anca Becze, and Dr. Eniko Kovacs – carried out a working visit to the Olive Research Institute in Izmir, Turkey. Details were established regarding the planning of olive varieties harvesting and the extraction of extra virgin olive oil, as well as the shipment of olive oil samples to the Romanian partner in order to identify possible adulterations using Raman spectroscopy. Two working visits were conducted: one visit to HAUS Centrifuge Technologies in Aydın, Turkey, to observe advanced technologies in olive oil processing and to identify collaboration opportunities, and another visit to the Orkide ZEYTINYAĞI Factory in Turkey to analyze the fully automated technological flow for olive oil production. ►***A1.3 Creation of a database with Raman spectra for both authentic and adulterated olive oils.*** A database was created that includes: information about authentic olive oils provided by the Turkish partners (regarding the origin and olive variety), the acquisition of Raman spectra for structuring the database, the processing of these spectra, and their integration with classification algorithms. ►***A1.4 Dissemination of results.*** 1 ISI article was published and three international conferences were attended.