MONITORING AND DETECTION OF BIOTIC AND ABIOTIC POLLUTANTS BY ELECTRONIC, PLANTS AND MICROORGANISMS BASED SENSORS (Mobiles)

Leader: **dr Anna Marzec-Grządziel**

The Mobiles project will work on the development of advanced biosensors for monitoring organic pollutants such as pesticides and hormones, and antibiotic-resistant microorganisms in water, soil and air. In addition, biosensors based on organisms such as genetically modified chemiluminescent bacteria capable of detecting antibiotics, heavy metals and pesticides in water, and plants that change color in the presence of arsenic in soil, will be developed. The Department of Microbiology at IUNG - PIB is involved in assessing genetic diversity and identifying microorganisms in soils contaminated by various pollutants.

The described tasks will be achieved by implementing an interdisciplinary approach combining electronic, biotechnological and microbiological technologies to create an integrated platform for contaminant detection and monitoring. The Department of Microbiology of IUNG - PIB participates in metagenomic and metatranscriptomic analysis of microorganisms of contaminated areas, supporting sequencing and bioinformatics analysis of genetic data.

The main objective of the project is to develop and validate innovative biosensors based on organisms and electronic technology for monitoring and detecting biotic and abiotic contaminants in various environments, including water, soil and air. The Department of Microbiology at IUNG - PIB is focusing on studying the effects of contaminants on soil structure and functionality, and is collaborating on the development of a genetic database.

Among other things, the environmental performance of the developed organisms and devices will be examined, including their impact on the environment, using safety and environmental compliance tests. The Department of Microbiology at IUNG - PIB will be responsible for the proper selection and collection of soil samples, as well as DNA/RNA extraction and cooperation in the sequencing of genetic material.

Start of the project: 09.2024.

The consortium meeting was held on 17.12.2024 at the Institute of Fertilization and Soil Science in Puławy.

Participants were:

- Anna Marzec-Grządziel, organizer (IUNG);

- Angelo Ferraro, project coordinator (NTUA);

- Giuseppe Puglia, project partner (CNR-ISAFOM);

- Francisco Falcone, project partner (UPNA);

- José Escola, project partner (UPNA).

The purpose of the meeting was to discuss the details of the database infrastructure that will be implemented later in the project, how to collect soil samples from different European countries, and methods for extracting DNA and RNA for sequencing analysis. Anna Marzec - Grządziel gave a presentation describing how soil samples will be collected. It was agreed that soil samples will be collected twice a year - in spring and autumn. Each soil sample will be analyzed chemically to assess selected contaminants.

Giuseppe Puglia presented regarding the types of data and the number of experimental points for analysis. The soil samples will generate three types of data: DNA sequences, RNA sequences, and chemical data. Francisco Falcone and José Escola discussed the possible architecture of the database.