



Internship proposal - Master 1 – 2023 (March-July)

Abundance and diversity of *Pseudomonas syringae* in the Danube River basin

Location: Chair of Microbiology, Faculty of Biology, University of Belgrade

This work will be carried out under the supervision of Prof. dr Slaviša Stanković, Prof. dr Tanja Berić and Ivan Nikolić, PhD.

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Context: The distribution and severity of plant pathogens in agroecosystems are relatively feasible to predict and mitigate. However, in the case of natural reservoirs of plant pathogens (wild plants, rivers, air), where community dynamics are complex and uncontrolled by humans, the outcome of the cascade of interactions that may be precipitated by environmental change remains mainly unexplored. In this context, the major need in plant disease management is constant surveillance which can encompass the whole pathogen potential. The plant pathogen *Pseudomonas syringae* (Psy) is one of the ten most important bacterial plant pathogens from an agricultural, biological, and economic perspective and certainly the most frequently emerging group of plant pathogenic bacteria. The pathogenic potential of Psy is reflected in (i) the ubiquity of species, (ii) their broad host range, (iii) the diversity of virulence strategies, and (iv) the diverse and surprising ecological niches it inhabits. Considering that Psy has an active role in water cycles in the biosphere, connection with irrigation systems (e.g., freshwater bodies) creates a natural reservoir of this bacterium and a potential source of infection. In light of the widespread dissemination of Psy within agriculture and among all the various habitats of this bacterium, the main challenge is to identify and survey risky situations that can set crops into contact with reservoirs of *P. syringae* under conditions favorable for disease.

Objectives: This project aims to explore the abundance and diversity of a Psy in the Danube River, extensively used for irrigation of agriculture fields in Serbia, and identify the natural reservoir of Psy as a potential source of crop infection. The specific objectives of the internship are:

- to collect, detect and identify Psy in the freshwater bodies used for irrigation (Danube River).
- to analyze the genetic diversity of collected Psy strains, and to determine phylogenetic relationships between collected strains.
- to identify phenotypic traits related to pathogenicity.

Work plan:

- Field sampling of Danube River and Psy isolation (5 sampling sites, water sample collection, determination of physical/chemical properties of water, Membrane filtration, Semi-selective medium for Psy isolation, colony PCR detection and identification)
- Genetic diversity assessment (*cts* gene amplification and sequencing, sequence analysis, and phylogenetic analysis)
- Phenotypic diversity assessment (set of assays for motility, ice nucleation activity, hypersensitive reaction, and pectinolytic activity)