



Antibiotic resistances on manured and irrigated soil

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Abstract

The intensive use of antibiotics in human health, livestock and industry has led to the presence of a wide range of antibiotic residues and multiresistant bacteria in several matrices, detectable by environmental monitoring, becoming an emerging public concern. Collecting information on the effects of antibiotics on agricultural ecosystems requires local and regional environmental surveys. The Lis Valley Irrigation Project was selected as a case study area, due to the great agricultural and socio-economic importance it has for the Region. However, in the summer, the poor water quality and water scarcity can have negative implications for the agroecosystem. This work describes a research project to characterize the origin of resistant bacteria and resistance genes in different water, soil and plant matrices. Through monitoring and experimentation, it intends to contribute to the management of irrigation water. Tasks include: 1) selection of sampling sites through water distribution systems, irrigated fields and crops; 2) characterization of sampling sites; 3) quantitative and qualitative examination of bacteria resistant to antibiotics; 4) determination of antibiotic resistance profiles; 5) detection and identification of resistance genes; 6) identification of sources of contamination and reservoirs. The expected results for sampling sites, their temporal variability in the selected matrices are: 1) total of cultivable bacteria; 2) profile of antibiotic resistance per isolate for different classes of antimicrobial agents; 3) detection and identification of antimicrobial resistance genes. These data will provide insights into the entry and exit of antibiotic resistant bacteria along watercourses, the contribution of wastewater and different agricultural practices to the spread of these contaminants in the microbial community of this ecosystem, and thus contribute to delineating the best irrigation water management practices to be adopted in the Valley. This study was carried out in the Lis Valley, Portugal.

Keywords: antibiotic resistance, irrigation water, multidrug resistant bacteria, water reuse