



UNIONE EUROPEA
Fondo Sociale Europeo



ANNEX 1

**Call by public competition for 4 PhD scholarships for research
on "Green" and "Innovation" topics
"PON Ricerca e Innovazione 2014-2020"
(D.M. 1061/2021)
Academic year 2021-2022 (XXXVII Cycle)
Rector's Decree n. 462/2021**

"Scholarships available"

Scholarship n. 1	
Action	Green
Title	Green synthesis of Quick Polar Pesticides (Quppe) to be used as Certified Reference Material (CRM) or Isotopically Labelled Internal Standards (ILIS) in the multi-residue analyses of food matrices.
Curriculum PhD program	Applied Biology
Scientific referent	Prof.ssa Laura Scrano
Summary of the research topic	The research aims to replace the methods of extracting pesticide residues from foods that use organic solvents with specific extraction kits based on aqueous solvents and chemical-physical technologies. The kit to be developed must solve the issues of extracting very polar pesticides from plant matrices not compatible with QuEChERS. The extract obtained with the innovative method described must contain the reference standards, even in the form of labelled products, for immediate recognition and quantification in LC-ESI / MS / MS to be possible. Compounds labelled with isotopes are used as internal standards (ILIS) to correct volumetric variations, matrix effects and other errors. The high-resolution mass spectrometry allows performing the best accurate method for this type of analysis.
Period in the company	12 months
Period abroad	6 months



UNIONE EUROPEA
Fondo Sociale Europeo



Scholarship n. 2	
Action	Innovation
Title	New techniques for the exploitation and protection of groundwater resources hosted in fractured carbonates.
Curriculum PhD program	Geo-Sciences
Scientific referent	Prof. Giacomo Prosser
Summary of the research topic	The research project is aiming at using innovative techniques for the analysis of shallow-water carbonate rock volumes exposed in selected areas of the Southern Apennines (Italy). To this end, the project focuses on the geometry, distribution, and scaling law properties of both diffuse and localized fracture sets. The goal is to apply this knowledge to the better understanding of the fluid accumulation and flow properties of fractured carbonate groundwater reservoirs. The research will be carried out on selected outcrops forming surface analogues of the carbonate aquifers. Data gathered in the field by mean and real and digital outcrop analysis will be computed in order to later perform discrete fracture network modelling (DFN) of geocellular volumes. As a result, the values of fracture porosity and equivalent fracture permeability will be obtained for multiple geocellular configurations. A particular attention will be paid to the analysis of fault zones, which will be investigated in order to know the compositional, microstructural and petrophysical properties of carbonate fault rocks localized along main slip surfaces. This research will provide new data on the permeability structures of fault zones that will be applied to the definition of groundwater flow in fractured carbonate rocks. This will improve the techniques used for the extraction and protection of the groundwater, allowing a long term and sustainable use of this resource.
Period in the company	6 months
Period abroad	6 months



UNIONE EUROPEA
Fondo Sociale Europeo



Scholarship n. 3	
Action	Green
Title	Green extraction methods for obtaining specialized metabolites of high biological value from plant matrices.
Curriculum PhD program	Applied Biology
Scientific referent	Prof. Luigi Milella
Summary of the research topic	In recent years the attention to well-being and health constitutes a common goal through which the consumer, also paying attention to the environment, look for alternatives to chemically synthesized molecules, with a consequent increasing attention to natural substances. Plant extracts, rich in bioactive compounds from primary plant matrices or from other matrixes "(by-products of the agri-food industry), are, to date, a important source for the production of food supplements, cosmeceuticals or fortified foods. Recently, the extraction methods used, combining ecological solvents and innovative methodologies guarantee respect to the environment and health. On the other hand, phytocomplexes obtain careful analysis, thanks to the use of advanced chromatographic methods for their standardization e characterization, as well as a rigorous assessment of biological activity using <i>in vitro</i> (cell free or cell based) or <i>in vivo</i> tests for the definition of the activity, efficacy and possible toxicity in order to understand the potential use in the pharmaceutical field.
Period in the company	6 months
Period abroad	6 months



UNIONE EUROPEA
Fondo Sociale Europeo



Scholarship n. 4	
Action	Innovation
Title	Insects as an innovative and sustainable source of chitin and its derivatives for applications in the hygienic-sanitary and cosmetic fields.
Curriculum PhD program	Applied Biology
Scientific referent	Prof.ssa Patrizia Falabella
Summary of the research topic	The research project aims to the use of insects as an innovative and sustainable source of chitin and its derivatives for applications in the hygienic-sanitary and cosmetic fields. The research activities include the valorisation of waste and by-products of the agri-food industry through the study of bioconversion processes mediated by the <i>Hermetia illucens</i> insect and its use as a sustainable and innovative source of chitin and chitosan, a biodegradable, biocompatible and antimicrobial biopolymer. The protocols for the extraction of chitin and its transformation into chitosan will be optimized, also using green methodologies; chitin and chitosan will be characterized, and it will be evaluated the possibility of using chitosan for the functionalization of non-woven fabrics for the medical sector and for the formulation of personal care/cosmetic products and hygienic-sanitary products, including antimicrobial disinfectant gels effective and not harmful to the skin.
Period in the company	6 months
Period abroad	6 months