University of Genova

Department of Earth, Environmental and Life Sciences

Doctorate Course in Earth and Environmental Science and Technology

Università degli Studi di Genova

STAT

Dottorato in Scienze e Tecnologie per l'Ambiente e il Territorio

Curriculum in Biology Applied to Agriculture and to the Environment

Research Theme n. 1

Titolo "*Caratterizzazione e valorizzazione di prodotti, sottoprodotti e composti bioattivi della filiera agri-food*"
Title "*Characterization and valorisation of products, by-products, and bioactive compounds from the agri-food chain*"

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Program description including the formation program abroad

The project aims to train qualified researchers in the field of plant biology and plant secondary metabolites focused on two main steps: 1) valorization of agri-food products, highlighting their indissoluble link with the territory of origin, also considering that Italy is the European country with the highest number of designation of origin and geographical indication products recognized by the EU; (2) valorization of by-products produced along agri-food chains by extracting valuable bioactive compounds using green processes and evaluating their biological activities.

Phytochemicals obtained can be used for different applications, such as dietary supplements, food preservatives as natural pigments, antioxidants, antimicrobials, or in cosmetics and phytotherapy. The derived bioactive compounds also have the potential to become a new generation of bio-products suitable for application in modern and sustainable agriculture, such as biostimulants or natural herbicides. The use of these bio-products could have beneficial effects such as inducing low toxicity to humans and the environment, enhancing the resistance of cultivated plants to biotic and abiotic stress, increasing yields and quality of crops, and reducing the use of mineral fertilizers and chemical pesticides.

Phytochemical analyses and biological assays will be carried out with the support and collaboration of other Italian Universities, with whom there is a long-standing and fruitful collaboration.

Techniques: optical and scanning electron microscopy, spectrophotometry tests, HPLC (high performance liquid chromatography), TLC (thin later chromatography), GC (gas chromatography) and GC-MS (gas chromatography-mass spectrometry), *in vitro* cell culture and cell-based assays, in vitro seed germination tests, statistical analysis.

Collaborations: given the multidisciplinary nature of this project, periods of mobility are foreseen in the Departments of other Italian Universities with which our laboratory is collaborating on a permanent basis. In addition, a period of 3 months in qualified foreign institutions may also be envisaged, to study specific topics related to the PhD project.

This research will also benefit from the collaboration and support of associations such as: 'Enoteca Regionale della Liguria' and 'Consorzio di tutela del Basilico Genovese D.O.P.', with which consolidated agreements are in place.

Financial support: Tutors' departmental research funds

Tutors' publications (max 3)

-Cornara, L.; Ambu, G.; Alberto, A.; Trombetta, D.; Smeriglio, A. (2022). Characterization of Ingredients Incorporated in the Traditional Mixed-Salad of the Capuchin Monks. *Plants,* Vol. 11, 3, art. N°301. doi:10.3390/plants11030301

-Malaspina P, Papaianni M, Ranesi M, Polito F, Danna C, Aicardi P, Cornara L, Woo SL, De Feo V. (2022). *Eucalyptus cinerea* and *E. nicholii* by-Products as Source of Bioactive Compounds for Agricultural Applications. *Plants*, Vol.11(20), art. N°2777. doi: 10.3390/plants1120277.
-Cornara L.; Smeriglio A.; Frigerio J.; Labra M.; Di Gristina E.; Denaro M.; Mora E.; Trombetta D. (2018) The problem of misidentification between edible and poisonous wild plants: Reports from the Mediterranean area. *Food and Chemical Toxicology*, Vol. 119, Pages 112 – 121. doi: 10.1016/j.fct.2018.04.066