

Isolation and characterization of plant extracts of pharmaceutical, cosmetic and food interest by bioassay guided studies

Stefano Acquadro

Department of Drug Science and Technology, University of Turin, Turin

stefano.acquadro@unito.it

Tutor: Patrizia Rubiolo (UniTO)

The scientific area in which this doctoral project is located is the wide and compiste filed of natural products. Specialised metabolites from plants can serve as defence against herbivores, microbes, viruses or competing plants (1). Since ancient times natural products have played an important role all over the world in the treatment and prevention of human diseases and were successfully used for the discovery of new lead compounds (2). In this context, the main goal of this thesis is the chemical and biological investigation of unexploited parts of food plants with potential healthy properties: pomegranate (*Punica granatum* L.) and grapevine (*Vitis vinifera* L.) (Fig.1). Regarding pomegranate, preliminary experiments were carried out on leaves, bark and peel ethanolic extracts which resulted active towards two enzymes involved in HIV-1 replication and were therefore phytochemically characterized. Subsequently, the attention was focused more deeply on the poorly investigated leaves for which the phytochemical pattern was evaluated for plants of different origin, harvesting season and year. Beside the whole ethanol extracts, the attention was also focused on phenolic and triterpenoidic enriched fractions, obtained by fractionation with chromatographic techniques. To evaluate the constancy of the extracts, phytochemical analysis were performed using HPLC-PDA-ESI-MS/MS and GC-MS systems combined with unsupervised multivariate data analyses. Biological assays were performed on pomegranate leaves' extracts, fractions and pure compounds against HIV-1 and also Zika virus since its infection has recently attracted the attention of the medical community (3). At the same time, *in vitro* studies were also carried out on their anticancer activity against acute lymphoblastic leukemia and multiple myeloma cell lines, considering the urgent need of cytotoxic agents that may overcome the ever increasing drug resistance. The second investigated matrix was the residues generated by the spring pruning of the grapevine plants (GPRs), an abundant but uninvestigated by-product of the wine supply chain. The study was therefore focused on the polyphenols characterization of GPRs from 16 red and white *V. vinifera* cultivars from Piedmont (Italy). The results were compared with those obtained for the leaves, in literature reported as a good source of bioactive nutraceutical compounds (5). *In vitro* antioxidant assays were also carried out on the leaves and GPRs, to compare their potential activity. In conclusion, the investigations carried out on the two investigated plants showed that these unexploited parts of plants can be a promising source of active compounds to be used in several fields.

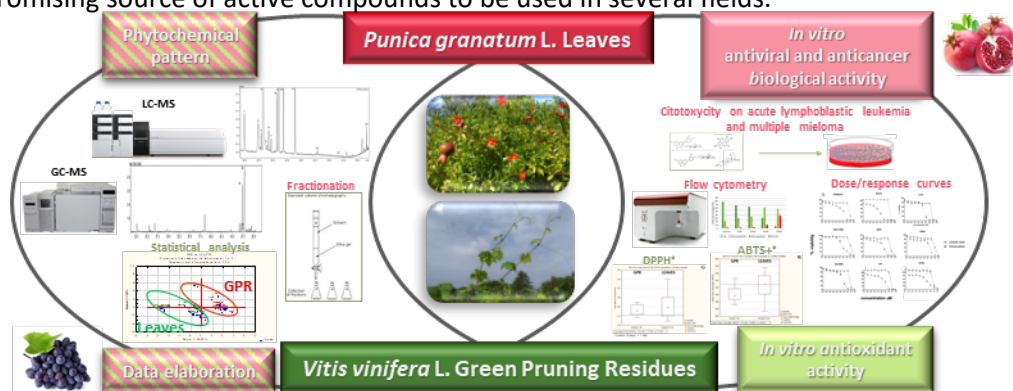


Figure 1: Visual summary of the strategy applied for the investigation of pomegranate leaves and GPRs.

- 1) M. Wink, Phytochemistry (2003) 64, 3–19
- 2) M. Lahlou, Pharmacol Pharm (2013) 4, 17-31
- 3) Wenham et al. Globalization Health (2019) 15, 49-56
- 4) M. Saeed, N. Mahmoud, Y. Sugimoto, T. Efferth and H. Abdel-Aziz, Front. Pharmacol. (2018) 9, 136-151
- 5) M. Maia et al. Food Funct. (2019) 10, 3822-4456