Ph.D. in Chemical Sciences
Cycle XXXVI

PI: Alessio Cimmino

Research project title:
Isolation and chemical and biological characterization of phytotoxins produced by phytopathogenic fungi of agrarian crops

Keywords: Crop diseases, Phytopathogenic fungi, Phytotoxins, Structure-Activity, Biopesticides.

Research project abstract:

Phytotoxic metabolites produced by *Colletotrichum* and *Kalmusia, Truncatella, Seimatosporium Phaeoacremonium (P. scolyti, P. italicum e P. alvesii)* species, responsible for serious diseases of plants of agricultural interest such as legumes and vines, will be isolated. Their role in plant diseases will be clarified as well as their potential practical application in agriculture and other fields will be assessed. Also the phytotoxins produced by *Pleurostoma richardsiae*, a fungal pathogen of grapevine wood and other plants.
The structure of the phytotoxic metabolites will be determined with spectroscopic methods (1D and 2D ^{1}H and ^{13}C NMR and HR ESIMS), while the relative configuration will be assigned by 1H and NOESY NMR and by X-ray diffractometric analysis, while the absolute configuration will be assigned spectroscopic and chiroptic methods (ECD, VCD, ORD) combined computational analysis. The biological characterization will concern assays of phytotoxic activity on host and non host plants, and antimicrobial activity. "Ad hoc" derivatives of the selected phytotoxins will be synthesized to conduct structure-activity correlation studies and on the mechanism of action. Phytotoxins will also be used in sensitivity assays to select genotypes of pathogen-resistant plants. Their antagonistic activity against phytopathogenic agents (fungi and bacteria) and their potential application in medicine will also be evaluated