

## Agrifood and nutrition

Research and technologies for nutritional characteristics of several agrifood products using modern platforms and infrastructures, e.g, metabolomics, stable isotopes, sensory panels. Molecular tools and statistical models applied in the field of molecular ecology to understand the distribution and adaptation of native and alien species (plants, animals, and insects).



### Genomics and Biology of Crops and Aquatic Systems

- ▶ Functional and structural characterization of genes from grapevine, apple, and strawberry.
- ▶ **New breeding technologies**, e.g., cisgenesis and CRISPR-CAS9, in apple and in grapevine.
- ▶ **Development of new varieties** of strawberry, raspberry, blueberry, cranberry, apricot, and cherry.
- ▶ **Hydrobiological and hydrochemical techniques** integrated with metabolomics, molecular biology and NGS, stable isotopes, high frequency data sensors.

### Ecology and bioresources

- ▶ **Conservation genetics**, analysis of genetic diversity and differentiation in vertebrate species from mountain ecosystems.
- ▶ **Biotic and abiotic factors** affecting the distribution of genetic diversity, in relation to landscape genetics.
- ▶ **Integrated systems** to control insect pests with low impact, such as semiochemicals and semiophysicals.
- ▶ **Antifungal products** synthesized by microorganisms and plants, and beneficial microorganisms.

### Plant Pathology and Pests

- ▶ **Biological mechanisms** that regulate phylogenetics, physiology, and ethology of insect crop pests.
- ▶ **Open field, greenhouse and lab tests** of vegetable extracts and natural product against *Plasmopara viticola*.
- ▶ **Secondary metabolites production** through cell cultures of *S. sclarea*, *S. officinalis*, *T. vulgaris* and *R. officinalis*.
- ▶ **Risk maps** for crop pest species, e.g., *Halyomorpha halys*, *Drosophila suzukii*, *Cydia pomonella*, *Plasmopara viticola*.

### Microbiology and Food Safety

- ▶ **Microbial ecology** of microscopic organisms for sustainable utilization in agriculture, industry, and medicine.
- ▶ **Dairy microbiology** with focus on studying the bacterial biodiversity in milk and local cheeses from raw milk.
- ▶ **In vitro cell models**, e.g., colonic epithelial cell lines, and in vivo dietary interventions with human volunteers.
- ▶ **Fermented foods** and functional ingredients from fibers, prebiotics, probiotics, and polyphenols.

### Food Quality and Security

- ▶ **Analytical chemistry of volatile compounds** through GC-O, GC-MS, GC-TOF, and GC-MS/MS.
- ▶ **Analytical chemistry of food metabolites** through LC-MS and LC-DAD-MS instrumentations (QqQ and QTofs).
- ▶ **Volatile Organic Compounds (VOCs)** assessed by Proton Transfer Reaction Time of Flight Mass Spectrometry (PTR-TOF-MS) for consumers' studies.
- ▶ **Stable isotope ratios analysis** of bio-elements (H, C, N, O, S).