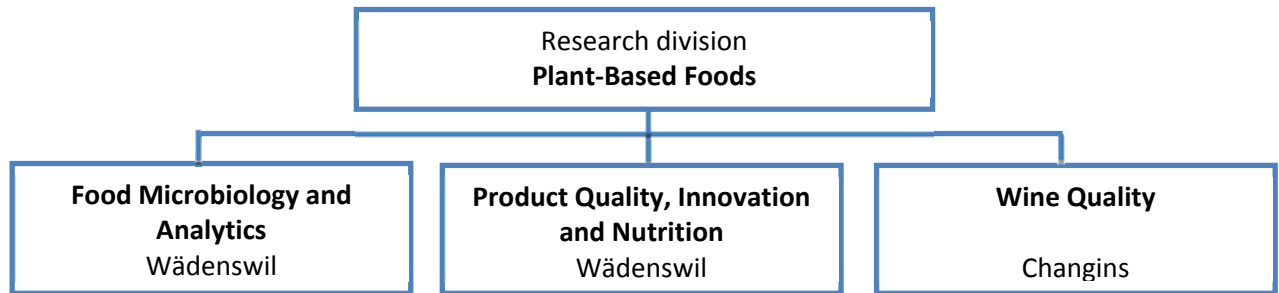


Analytical profile Plant-Based Food (IFS Wädenswil)

The **Plant-Based Foods** research division comprises three research groups, two based at the Wädenswil site and one at the Changins site.



The research division specialises in applied and practice-oriented research in three main areas:

- research into microbial risks and factors affecting quality in fruit, vegetables and beverages in the food production chain
- research into the health benefits of fruit and vegetables and bioactive substances
- analytical services for in-house and external customers and official analytical inspection of wines for export (enforcement)

Analytical activities play a key role in all three of these areas. The research groups have the specific skills and expertise in food and microbiology analysis and are equipped with the appropriate infrastructure to meet the needs of research in their project portfolios .

Food Microbiology and Analytics

The **Food Microbiology and Analytics** research group (FG31.1) has the following analytical profile:

Microbiological analyses of plant-based foods and environmental samples

- performing **microbiological analyses** for desirable and undesirable microorganisms and human pathogens in foods of vegetable origin and environmental samples (soil, seed, water, fertilisers)
- **determination of antibiotic resistance**
- biotyping of microorganisms by molecular biology and mass spectrometry-based techniques
- applying microbiology and molecular biology techniques for analysing **microbial communities** and their **interaction** with plants
- genotyping and phenotyping of **yeasts** for fermentation processes used in food production (e.g. wine yeasts)

Physicochemical analyses of plant-based food

- performance of **physical and chemical analyses** for the identification and quantification of a broad range of compounds in fruits, vegetables, fruit juices and wine as well as of microbial metabolites in foods
- developing and establishing **non-destructive analytical techniques** (NIR) for determining quality characteristics for major fruit and vegetable crops under pre- and post - harvest conditions
- development of **rapid photometric techniques for measuring** quality, safety and antioxidant parameters in fruit and vegetables
- screening of food and environmental samples for **volatile substances**
- providing researchers with **expert advice on and support** with chemical and microbiological analyses when performing joint projects

Storage

- routine measurements of fruit quality
- specific measurements of fruit quality and physiology (ethylene, respiration, flavour compounds)

Extension services beverage/wine analytics and distillates

- characterisation of the quality of alcoholic and non-alcoholic beverages
- development of customer-specific quality assurance solutions and consultancy
- investigation of physicochemical, microbiological and sensory test criteria in wine, must, fruit juices, spirits and vinegar products

Nutrition

- measurement of secondary plant constituents
- *in vitro* digestion experiments

Sensory evaluation

- sensory analyses of fruit and vegetables and processed fruit and vegetable products

Analytical equipment and techniques (summary)

Microbiological analyses

- analytical microbiology: MALDI-TOF mass spectrometry (MALDI biotyping), antibiotic resistance screening
- electron beam devices for non-thermal, non-chemical inactivation of pathogens
- molecular biology: real-time PCR, sequencing, PFGE
- microscopy

Physicochemical analyses

- multiple HPLCs, 1 UPLC-DAD, 1 UPLC-MS
- multiple GCs, 1 GC-MS
- non-destructive NIR spectroscopy (NIR Case, Labspec, Phazir, DA-Meter)
- SmartNose
- various spectrophotometers and titration stands
- Arena Analyzer (pipetting robot and photometer)
- microtitre plate reader (absorption, fluorescence, luminescence)
- 1 TA XT2i texture analyser

Storage

- Pimprenelle automated analyser for determining fruit flesh firmness, sugar and acid content in pome fruit
- GC for measuring ethylene
- micro GC for respiration measurement
- acid titration station

Extension services beverage/wine analytics and distillates

- microscopy, germination testing
- potentiometry, iodometry, titration
- refractometry, digital oscillating U-tube density measurement

- infrared, UV, visible light and atomic absorption spectrometry
- distillation
- HPLCs, GC
- enzymology

Nutrition

- *in vitro* digestion system for assessing bioaccessibility of carotenoids, etc.
- induction stove, microwave, various kitchen appliances

Sensory functions

- qualitative and quantitative sensory analysis techniques in accordance with DIN/ISO standards

General

Laboratory rooms with fume hoods and standard media, autoclaves, incubators, centrifuges, freeze driers, biosafety cabinets, laminar flow cabinets and other standard equipment.

Infrastructure

- BSL-2 microbiology laboratories, one equipped with MALDI-TOF (Microflex, Bruker)
- Co-use of a BSL-2 greenhouse
- multiple analytical laboratories
- special food preparation room
- measurement room for Pimprenelle measurements
- 2 respiration systems for O₂ and CO₂ measurements in CA storage rooms
- 1 sensory room with Sensoplus sensory software
- 1 sensory room with 12 individual booths, a trained in-house panel and FIZZ software
- *in vitro* digestion system

Unique characteristics

- very varied range of advanced research and routine instruments for destructive and non-destructive quality analysis of fruit, vegetables and beverages (wine, distillates and fruit juices)
- unique analytical equipment for specific fruit quality and physiology measurements (oxygen and carbon dioxide, ethylene, flavour compounds)
- state-of-the-art technology for typing microorganisms and determining antibiotic-resistance using mass spectrometry (MALDI-TOF) techniques
- sound expertise in characterisation of yeasts for fermentation processes
- very well equipped sensory laboratory for simple or complex qualitative and quantitative tests on fruit and vegetables and processed fruit and vegetable products
- internationally recognised *in vitro* digestion system for assessing bioaccessibility of secondary plant substances (e.g. carotenoids)