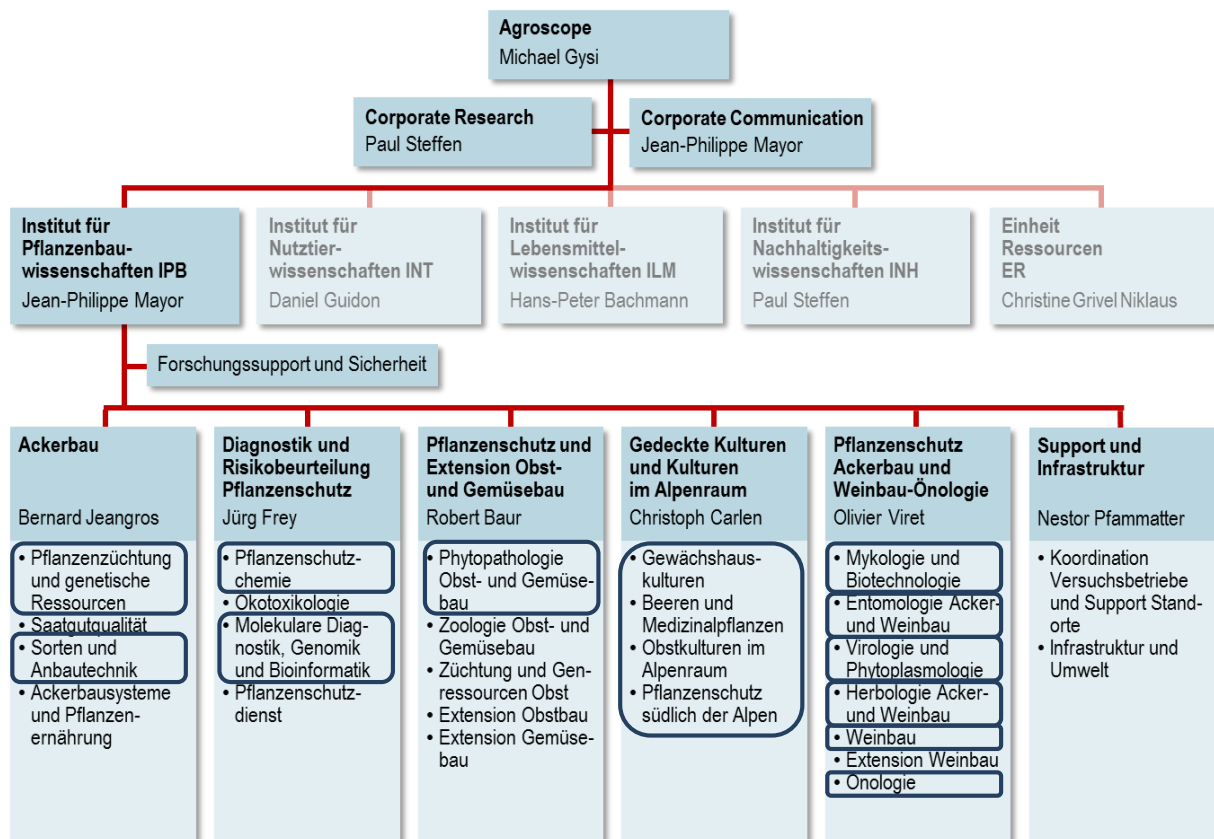


## Analytical profile Plant Protection (IPS Wädenswil)

Wädenswil is home to two research divisions working in the **plant and environmental protection** field. Their focus is in **plant protection chemistry and plant protection products, molecular diagnostics, genomics and bioinformatics; phytopathology/diagnostics for organisms of agricultural importance and quarantine organisms** in the fruit and vegetable farming for the **import** sector and as part of **diagnostic and enforcement activities** (for clients including the Federal Office for Agriculture (FOAG), the Swiss Federal Plant Protection Service (SPPS) and the Agroscope Plant-Protection Service (APS)).



### Tasks and activities

#### Plant-Protection Chemistry:

- the presence, fate and behaviour of **plant protection products, their metabolites and other xenobiotics** in soil, surface water, groundwater and sewage treatment facilities
- **plant protection product market control** in collaboration with the FOAG and cantons, coordinated through the Federal Office of Public Health's (FOPH) market monitoring platform

#### Molecular Diagnostics:

- enforcement activities relating to **identification** of quarantine pests (using DNA barcoding) on **goods for import**
- (further) development of **molecular diagnostic methods and tests**
- **studying the dispersal dynamics of pest organisms and counter-measures**

- **genotyping** (marker-assisted selection), **characterisation** of genetic plant resources

#### **Genomics and Bioinformatics:**

- **genome sequencing**, data processing and analysis
- **development of bioinformatic analytical methods:** development of **genome assembly** pipelines (especially for prokaryotes), **transcriptome analysis, metagenomics**
- acquisition and realization of **research projects** (external funding)

#### **Phytopathology of Fruit and Vegetable Crops** (diagnostic work for FOAG, SPPS, APS):

- **diagnostic work** on **quarantine organisms** (QO) in **suspect samples** (CH and import)
- analysis of **fire blight suspect samples** from across Switzerland and from young trees (SPPS inspections in nurseries)
- **monitoring** the development of **streptomycin resistance in the fire blight causal pathogen** after streptomycin application in orchards
- **surveys** of quarantine organisms in Swiss crops on behalf of the APS
- development of new **diagnostic procedures** and **methods** for new **plant pathogens**
- collaboration on **international committees**
- identification and development of **resistance markers** in **apples**

#### **Analytical equipment and techniques (summary)**

##### **Plant-Protection Chemistry**

- ASE, SPE for preparing environmental samples (water, soil, plants)
- analytics of environmental samples for plant protection products and xenobiotic traces (GC-MS/MS, LC-MS/MS)
- separation procedures for chiral compounds (quantitative and qualitative, LC, GC)
- preparation of plant protection product formulations
- physicochemical tests for plant protection product formulations
- analysis of plant protection product active ingredients and relevant contaminants in plant protection product formulations (GC-FID, GC-ECD, GC-MS, GC-MS/MS, HPLC-DAD)

##### **Molecular Diagnostics, Genomics and Bioinformatics**

- genome and DNA sequencing
- PCR, qPCR, ultrafast PCR
- LAMP diagnostic procedures
- pipetting robots
- microarrays
- DNA extraction, concentration, quantification and fragmentation
- bioinformatics infrastructure for genome analyses

##### **Phytopathology**

- conventional isolation and cultivation of bacteria and fungi
- morphological identification of phytopathogenic bacteria and fungi
- rapid immunological tests for the identification of quarantine bacteria
- PCR-based identification of quarantine organisms (conventional, nested and real-time)
- 4 thermocyclers (PCR), 1 real-time thermocycler (qRT-PCR)
- 1 Bioscreen for growth curve analyses
- 1 bioanalyser for DNA fragment analyses for the identification of pathogens and resistance

## General infrastructure

Plant protection product market control laboratory, climate-controlled BSL-2 laboratories with biosafety cabinet (HEPA filter) for diagnostic mycology and bacteriology, quarantine greenhouse with 8 cubicles (each 10.5 m<sup>3</sup>), including laboratory and pass-through autoclave in containment, plant protection greenhouse for raising plant materials, biosafety cabinets, sterilisation and decontamination equipment, centrifuges.

## Unique characteristics

### *Environmental behaviour and market control of plant protection products*

- **research** on the **environmental assessment** of **plant protection products as part of the licensing process**
- **integrated analytics** from sampling in various environmental compartments, lab-based incubation experiments where required, methodological development, sample preparation and analysis (for traces) including model-based analysis and interpretation of the data, **combined with expertise in plant protection product chemistry, licensing and market control**
- many years of experience with **enantioselective separation procedures**
- **regulatory activities** in collaboration with the FOAG and cantons
- as far as we are aware, our laboratory is the only laboratory in Switzerland and one of the few laboratories in Europe with **experience and expertise in investigating plant protection product formulations**

### *Molecular diagnostics, genomics and bioinformatics*

- more than 20 years' experience with DNA sequence-based **molecular diagnostic** techniques
- experience with **molecular biology techniques**
- core competence in **development of novel, rapid diagnostic procedures**
- **broad diagnostic spectrum** (viruses, bacteria, phytoplasmas, fungi, arthropods, plants) and a wide variety of equipment for performing diagnostic research projects
- hosts the **Agroscope Genomics and Bioinformatics Network (ANET GB)**
- expertise in **genome sequencing** using **bioinformatic analysis methods**; development of analysis pipelines, data integration and novel proteogenomic approaches
- strong national and international **networks**

### *Phytopathology of fruit and vegetable crops*

- **diagnosis** of quarantine fungi and bacteria of fruit and vegetables
- DNA and protein-based **methodological development**