Unit of Genetics and Molecular Biology

Head of Unit – Gunārs Lācis, PhD
Development

- Focused research in field of fruit crop genetics and molecular biology **started in 1996** (work done mainly in laboratories of other institutes, incl. Institute of Biology, University of Latvia, Swedish University of Agricultural Sciences, Michigan State University, USA)
- **Laboratory of Molecular Biology established in 2005**
- **Unit of Genetics and Molecular Biology established in 2008**
- **Staff:**
  - 1996-2006 – 1 researcher
  - 2006-2010 – 2 researchers
  - since 2010 – 3 researchers (2 PhDs, 1 MSc)
Research

• The research in fruit crop genetics and molecular biology can be divided into three mutually connected activities:
  – Evaluation and characterization of fruit crop genetic resources
  – Development and implementation of advanced fruit crop breeding methods
  – Research on fruit crop genetics, development and application of molecular markers

Unit of genetics and molecular biology, Latvia State Institute of Fruit-Growing
Evaluation and characterization of plant genetic resources (PGR)

- Unit is responsible for fruit crop genetic resources management - **2500 accessions** of **17 fruit crops**, 676 accessions are designated as national genetic resources

- **Phenotypical** of all main fruit and berry species have been developed or/and adapted (apple, pear, cherry, plums, berry crops, sea buckthorn) – in cooperation with Unit of Breeding and Variety Testing.

- Collection-wide genotyping using molecular markers (**790 accessions**) performed

- **Genotyping data have been used in:**
  - Identification of genotypes – detection of duplication in the collection
  - Evaluation of collection genetic diversity and structure
  - Collection screening for valuable gene sources

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Development and implementation of advanced fruit crop breeding methods

• **Selection of parental cultivars** using genotyping data – in cooperation with Unit of Breeding and Variety Testing

• **Implementation of MAS** (Marker Assisted Selection) - breeding support:
  – **$S$-gene allele** genotyping for sweet cherries with further inheritance and population analysis, detection of cultivar compatibility groups.
  – Early screening and selection of sweet cherry breeding material using **marker for self-compatibility** ($S4'$) allele,
  – Early screening and selection of apple breeding material using **scab resistance** gene molecular markers (e.g. $Rvi6$ ($Vf$))
Research on fruit crop genetics, development and application of molecular markers

• Research of **domestic plum self-incompatibility** using molecular and cytoembriiological approaches.

• Research on **resistance to apple and pear scab** (*V. inequalis* and *V. pyrina*) using molecular genetics, looking for new resistance sources as well as clarifying resistance inheritance mechanisms (in cooperation with the Unit of Breeding and Variety Testing and Unit of Plant Pathology and Entomology).

• research of possible **resistance mechanisms and resistance sources** to a new fungal disease caused by *Gnomonia fragariae* in strawberry (in cooperation with the Unit of Plant Pathology and Entomology).
Results & Cooperation

• Results in Genetics and molecular biology (2006-2013):
  – 20 scientific publications (incl. 1 PhD Thesis, 11 in SCOPUS)
  – 4 submitted publications
  – 12 national and international projects
  – 18 presentations in the international scientific conferences

• Cooperation (common projects, publications, common use of research infrastructure, equipment):
  – Genetic Resources Centre of Latvia in the forest research institute “Silava”, Latvia
  – Plant Genetics laboratory, Institute of Biology, University of Latvia
  – Swedish University of Agricultural Sciences
  – Department of Horticulture, Michigan State University, USA

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