Latvia State Institute of Fruit - Growing

General information

The Latvia State Institute of Fruit-Growing was established in 1995.The present status was given to the Institute on May 2, 2006. At present it is under the jurisdiction of the Latvian Ministry of Agriculture.

The climate in the region is favourable for fruit growing.

The average annual snow and rainfall is 560 mm, which is less than in many other areas of Latvia. The annual sum of active temperatures (over 5°C) is 2423°C. The active growth season is 135 – 140 days. The absolute minimal temperature is -36°C, which occurs only after each 5 – 10 years.

The maximum rainfall during the growth season is observed in July, while May and August have the least rainfall. The annual sunshine is 4522 hours. The soils in the orchards are neutral or slightly basic (pH 6.7 – 7.4) sandy loam.

General information

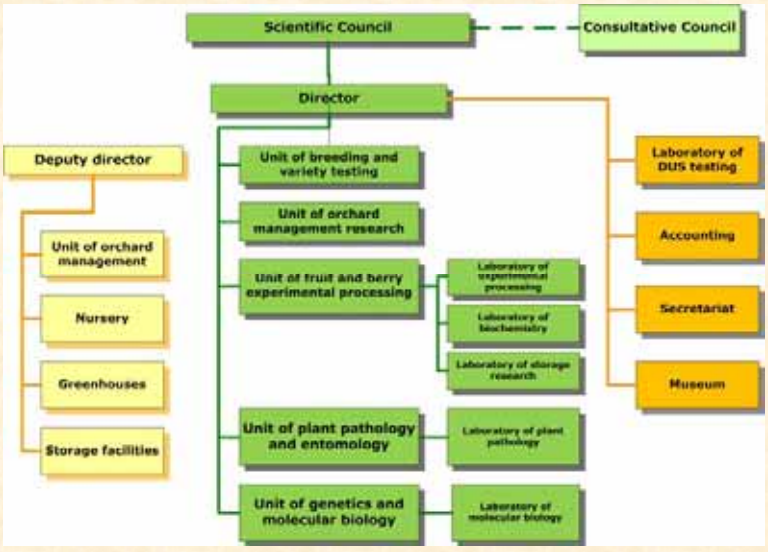
At present (January 1, 2008) the Institute's regular staff are 58 people, of which 45 are full-time researchers and technicians, including:

- **doctors of sciences – 9 (+ 4 doctors of sciences work part-time)**
- **masters of sciences – 4**

The age of 12 researchers is below 35.

General information

Latvia State Institute of Fruit-Growing has five research units:



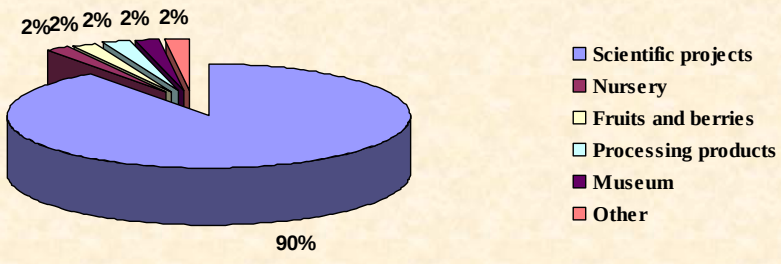
General information

The main tasks of the Institute are:

- **To provide scientific background and expertise for the working-out and implementation of the development policy in fruit-growing**
- **To work out recommendations for environment-friendly (integrated and organic) technologies in fruit growing, processing and storage**
- **To develop models for commercial orchard management in different regions of Latvia**
- **To perform breeding of fruit and berry varieties suitable to Latvian climate**
- **To provide maintenance and sustainable use of fruit, berry and lilac genetic resources**
- **To work out scientific background for a system of the production of healthy planting material in Latvia**
- **To perform DUS (distinctness, uniformity, stability) testing of new cultivars**

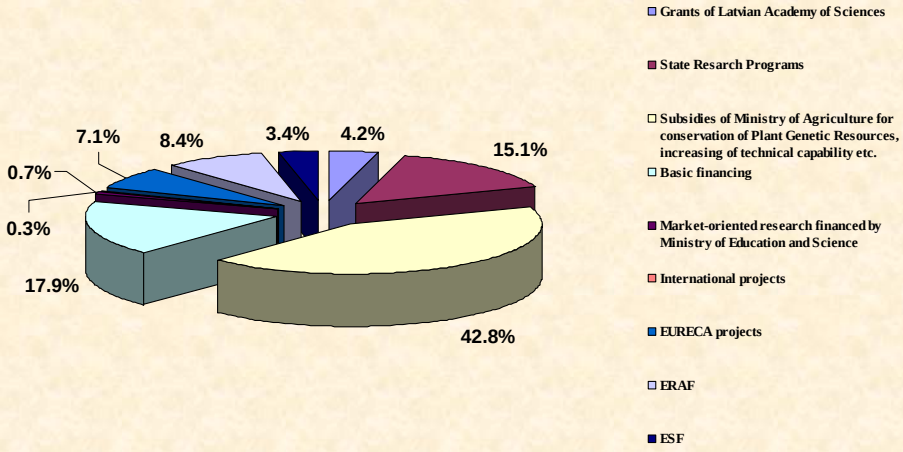
General information

Financing



General information

Financing for science



Fruit breeding and genetic resources

The Institute holds vast collections of fruit crop cultivars and selections. The rich collection material serves for breeding aims, as well as a source for genetical resources collections, which include numerous varieties and landraces of Latvian origin.

The main goal of fruit crop breeding at the Institute is to develop new varieties, which are:

- **adapted for cultivation in Latvia,**
- **with fruit quality suitable for commercial growing,**
- **resistant to diseases,**
- **ripen during an extended period of time,**
- **have tree or shrub habit easy for training and cultivation.**

Apple breeding

The most important breeding programme in our institute is apple breeding, since apples are the most important fruit crop in Latvia

Leading scientist, Dr.biol. **L. Ikase**

- For hybridization are used: donors of scab resistance (polygenic, genes *Vf* and *Vm*), tolerance to *Nectria* canker and other diseases, compact tree habit (including gene *Co*), winter-hardiness and fruit quality. Varieties with long storage potential and also suitable for processing are selected.
- The apple collection holds 700 varieties, clones and hybrids (of them 176 Latvian origin). Breeder's rights are protected for apple varieties: **'Ausma', 'Ilga', 'Magone', 'Agra', 'Atmoda', 'Ella', 'Olga'.** In 2006 varieties **'Baiba', 'Dace', 'Edite', 'Gita', 'Ligita', 'Roberts'** were handed in for DUS testing.

Sweet cherry breeding

The breeder P.Upītis started his work with sweet cherries in the 1940ies. Since the 1950ies some sweet cherry cultivars were developed by the breeders R.Āboliņš and A.Maizitis. Now sweet cherry breeding is continued at the Institute.

Leading scientist, Dr.agr. **S. Ruisa**
Research assistant M.biol. **G. Lācis**

- Introduced sweet cherry varieties which are hardy and productive in Latvia are used in hybridization with large-fruited varieties and self-fertility gene Sf donors. DNA markers are used to characterize sweet cherry genetic resources.

- The GR collection includes **55 (23 of Latvian origin) sweet cherry varieties and hybrids,** and **37 sour cherry varieties and clones (22 of Latvian origin)**.
- Registered cultivars: **'Aija', 'Aleksandrs', 'Indra', 'Jānis'.**

Japanese quince (*Chaenomeles*) breeding

Leading scientist, Dr.agr. **S. Ruisa**
Director, Dr.biol. **E. Kaufmane**

- Breeding is done paying special attention to winter hardiness of flower buds, early maturing of fruits, self-fertility, normal development of flower female generative sphere, thick fruit flesh and high content of biologically active substances (organic acids, phenolic compounds, pectins, aroma components); selection is targeted at varieties which can be mechanically harvested.
- The collection holds 64 Japanese quince genotypes selected in Latvia, Finland and Sweden. At present the main attention is paid to the evaluation and propagation of advanced selections.
- 2 selections of *Chaenomeles* are being prepared for registration.

Plum breeding and variety testing

Several breeders carried out the breeding of domestic plums since the 1950ies, but P.Upītis was the first who started his work with diploid plums. Breeding of diploid plums is continued now at the Dobele in a small scale.

Domestic plums: Director, Dr.biol. **E. Kaufmane,**
Diploid plums: Leading scientist, Dr.biol. **L. Ikase**

In the development of new domestic and diploid plum varieties, the main accent is laid on early maturing, winter-hardiness of flower buds, fruit quality, self-fertility. In 1996 – 2001 a common breeding program with Sweden was carried out. From this program result 3 advanced hybrids for which trials in different growing conditions are carried out at present. The new, promising cultivars are tested on different rootstocks.

- The plum GR collection includes **120 domestic plum varieties and hybrids (25 of Latvian origin)**, along with **64 diploid varieties and hybrids (26 of Latvian origin)**.
- Registered cultivars: **‘Agrā Dzeltenā’, ‘Inese’, ‘Minjona’, ‘Zemgale’.**

Small fruit breeding and variety testing

Black currants

Leading scientist, Dr.biol. **S. Strautiņa,** scientist, Dr. agr**. K.Kampuss**

- Crossing involves interspecific *Ribes* hybrids which are donors of resistance to mildew, bud mite and reversion virus.
- The GR collection includes **118 varieties and hybrids (18 interspecific hybrids, 16 species and other taxons)**. Joint breeding programme was fulfilled with Swedish and Lithuanian researchers during 1995-2002.
- 10 perspective forms are selected evaluation of which are continued.
- Registered cultivar: **'Mara'** (with National Botanic Gardens).

Small fruit breeding and variety testing

Raspberry

Leading scientist, Dr.biol. **S. Strautiņa**

- Breeding is done for resistance to didimellosis and anthracnosis. The use of large – fruited gene *L1* is started in the breeding since 1985. The main problem of that gene is the lack of stability after the propagation of plants *in vitro*. The maximum weight of the berries is 8 – 10 g; of cultivar 'Ina' it is 6 – 8 g.
- Breeding of autumn raspberries is also done.

The GR collection includes 44 raspberry varieties and hybrids.

- Registered cultivars: **'Arta', 'Dita', 'Ina', 'Ivars', 'Līna'.**

Pear variety testing

Scientist, Dr.agr. **M. Blukmanis,**
laboratory assistant **B. Prokopova**

- The collection of pears is evaluated and extended, selection of advanced hybrids and variety introduction are going on. The main tasks are: to select varieties with sufficient winter-hardiness and with good fruit quality which is maintained also after storage.

The pear collection holds 250 varieties and hybrids (of them 58 Latvian origin).
Registered cultivars: **Jumurda', 'Paulina'.**

Apricot variety testing

Director, Dr.biol. **E.Kaufmane**

- Apricot breeding in Latvia was started by two breeders – P.Upitis in Dobele un V.Vārna at the Botanical Gardens University of Latvia.
- The main attention is paid to selection of varieties with late flowering and high resistance to leaf spot, as well as tolerance to trunk damage by fluctuating winter temperatures.

- The collection holds 36 genotypes of Latvian origin.
- Registered cultivars: **'Daiga', 'Lāsma', 'Velta'.**

Gooseberry, red and white currant variety testing

Breeder A.Vīksne achieved good results (1950-1960) in gooseberry breeding. He left valuable breeding material: resistant to mildew, leaf spot and without thorns. At present this job is continued at the Dobele.

Leading scientist, Dr.biol. **S. Strautiņa**

•The agricultural and biological traits are being evaluated. For red and white currants, varieties suitable for commercial or home gardens are selected.

•Gooseberry GR: **30 varieties and hybrids (27 Latvian), red/white currant GR 23 (6 Latvian) varieties**.

Hazels and filberts

Leading scientist, Dr.biol. **S. Strautiņa**

75 hazels and filberts of Latvian origin are maintained in the genetic resources collection (all obtained by P. Upitis).

Grape variety testing

Scientist, Dr.agr. **M. Blukmanis**

- Latvian and introduced grape varieties are being evaluated. Varieties suitable for home gardens have been recommended for growing.
- The outdoor grape GR collection includes **154 (148 Latvian) varieties and hybrids**.
- Registered cultivars in Latvia and Sweden: **‘Zilga’, ‘Guna’, ‘Supaga’, ‘Sukribe’, ‘Veldze’.**

Research in genetics and molecular biology

Unit of Genetics and Molecular Biology was established in 2007.

M. biol., **Gunārs Lācis**, researcher, head of unit,
Irita Kota, assistant

Major research interests of the unit can be roughly divided into the following **areas**:

- Coordination of fruit and berry crop genetic resources maintenance, evaluation and characterization:

- Introduction and utilization of molecular marker methods in the fruit and berry crop breeding:
  - Introduction of gene- specific genetic markers in breeding – development of basis for Marker Assisted Selection (MAS). The research involves utilization of markers for resistance (e.g. scab resistance), gametophytic self-incompatibility (GSI) system in *Prunus* etc.
  - Evaluation of genetic diversity using molecular markers. Laboratory has adapted microsatellite (SSR) marker methods for major fruit and berry crops – apple, sweet and sour cherries, black currants, raspberries.

Research in orchard management

E. Rubauskis, M.agr., research assistant – apples, plums, sea buckthorn
M. Skrīvele, Dr.agr., leading scientist – coordination and leadership of the research
S. Strautiņa, Dr.biol., leading scientist – small fruits
S. Ruisa, Dr.agr., leading scientist – cherries, *Chaenomeles*, sea buckthorn
B.Prokopova, scientific assistant – pears
V.Surikova, B.agr., assistant – soil chemistry
Ilze Grāvīte- B.agr., assistant -plums
Daina Feldmane – B.agr., assistant - cherries

Research in growing techniques

The main aim of the research is the working out and improvement of orchard management technologies for fruit and berry plantations. Trials and observations are performed along the **following lines**:

- Testing of new pome and stone fruit **rootstocks** in Latvia; testing of dwarfing pear rootstock suitability for use as **inter-stocks; trials about the compatibility of the best rootstocks with commercially grown and promising cultivars**
- Studies on the **provision of best growing conditions** in fruit and berry plantations:
  - regulation and maintenance of soil moisture, cultivation of soil in strips
  - fertilizing and providing of optimal agrochemical conditions to plants
- **Research in plant protection -** in cooperation with scientists from other institutions: Latvian Plant Protection Research **Centre**

Research in growing techniques

•Evaluation and screening of the suitability of fruit crop varieties for **different training systems** and tree shapes, different time of training. A trial has been established for growing currants and gooseberries in espaliers.

•**Development of economically justified, environment-friendly** (integrated and organic) **technologies** for growing of more popular fruit crops and cultivars in different soil and climate conditions

•**Working out growing techniques for novel fruit crops.**

Research in plant pathology and entomology

- Unit of Plant pathology and entomology started its activities as Plant pathology laboratory in summer 2006.

Inga Moročko-Bičevska, Ph.D., leading researcher in plant pathology, head of unit, **Neda Pūpola**, M.Biol., researcher in virology, **Arturs Stalažs**, M.biol., Ph.D. student, researcher in entomology, **Anna Kāle**, M.biol., research assistant in virology

- **Main tasks and lines of the research:**
  - The development of scientific and theoretical basis for economically viable and environment friendly (integrated and organic) fruit growing technologies which are based on research of harmful organisms in Latvian orchards.
  - The development of methodical basis for establishing of the system of certified planting material for fruit crops in Latvia.
  - Diagnostics of insect pests and diseases of fruit crops.

Processing, biochemical investigation and postharvest management

The unit of experimental fruit and berry processing at the Institute was started in 1997.

Dr. sc. ing. **Dalija Segliņa**, leading scientist, head of unit; M.sc. ing.**Inta Krasnova** – scientist; **Gunta Heidemane** – assistant

Areas of work:

Testing of the suitability of cultivars for various ways of processing and development of new products;

Analyses of the biochemical content of traditional and untraditional fruit and berry crops and their processed products;

Evaluation of fruit and berry quality in dependence of storage regimes (temperature, gas - CO_2 and O_2 concentration).

Processing, biochemical investigation and postharvest management

Experimental processing laboratory:

The aim of the research of the Experimental processing laboratory of LSIFG is evaluation of the suitability of fruit and berry cultivars for different ways of processing (juice, puree, jam, jelly, drying, freezing) and the development of new products.

Research:

- work on **traditional crops** – apples, pears, plums, cherries, currants, gooseberries, raspberries;
- research with **untraditional crops** e.g. large-fruited cranberries (*Vaccinium macrocarpon*) , sea buckthorns (*Hippophae rhamnoides* L.), Japanese quince (*Chaenomeles japonica*).

Processing, biochemical investigation and postharvest management

Laboratory of biochemistry:

The studies of fruit and berry biochemical content are performed at the laboratory since 1979.
Chemical composition of fruit, berries and their processed products, biologically active compounds and technological properties are investigated at the laboratory.

Processing, biochemical investigation and postharvest management

Laboratory of fruit storage research:

Research of fruit and berry storage at LSIFG is performed in various storage regimes suitable for commercial production:

- In cool chambers with regulated temperature regimes;
- In controlled atmosphere chambers with regulated CO_2 and O_2 gas regimes (ULO – Ultra Low Oxygen);
- In freezers (-18 °C).

Cooperation

Local joint projects

- Developing of **technologies for commercial fruit growing** together with the Latvian State Centre of Plant Protection, Scientific Institute of Water Management and Land, Latvia University of Agriculture, Centre of Agrochemical Research, Scientific Laboratory of Agronomical Analyses of the Latvia University of Agriculture, Institute of Biology of the University of Latvia, Biomedical Research and Study Centre, University of Latvia, Pure Horticultural Research Center.
- **Experimental processing products** from fruits and berries**, their biochemical evaluation** together with the Faculty of Food Technology, LUA, Faculty of Chemistry, University of Latvia and several processing enterprises.
- Maintenance of **fruit crop genetic resources** together with the Latvia Genetic Resources Centre , Riga Technical University , Center.

Cooperation

During Soviet times the main cooperation existed with the **countries of Soviet Union** (Russia, Ukraine, Belarus, Moldova etc.). Since the beginning of **1990ies** successful cooperation was developed among the scientific institutions of **East and West European countries, as well as between Canada and USA** and our institute.
Scientists of institute are members of International Horticultural organisations – **ISHS, ECPGR, Eucarpia, EUFRIN** etc.

Cooperation

International projects

- Project **"Characterization of the Latvian and Swedish sweet and sour cherry genetic resources using morphological and molecular markers"** (together with Balsgård – Department of Crop Science, Swedish University of Agriculture and Michigan State University, USA).
- **Evaluation of North American apple rootstocks in Latvia** (together with Iowa State University, USA).
- **EU COST project "Euroberry Research: From Genomics to Sustainable production, Quality and Health"**
- **EU COST project "Bacterial diseases of stone fruits and nuts"**
- **EU COST project " Combining traditional and advanced strategies for plant protection in pome fruit growing"**
- **EURECA project "Functional food ingredients from plant products"**

Cooperation

International projects

- **EURECA project "Functional food ingredients from plant products"**
- **National program of the EU structural funds "Development of data bank for genetic resources of Latvian woody plants"**
- **Exchange of scientific information with research institutions:** Lithuanian Institute of Horticulture (Babtai), Holovousy Research Institute for Fruit Growing and Breeding (Czechia), Planteforsk division Njos (Norway), Polli Horticultural Institute (Estonia), Belarussian Research Institute for Fruit Growing (Samokhvalovitchy), Skierniewice Research Institute of Pomology and Floriculture (Poland) etc.
- **Several EU projects** for application are in preparation.

Applied research for fruit growing

- Institute has developed very successful cooperation with fruit and berry growers in Latvia. Our Institute was the initiator of the **Latvian Fruit Growers' Association** founded in 1997. Dobele HPBES is the collective member of the Association. All newest information obtained by scientifical research, which can become useful for commercial growers, is passed on to the farmers with the help of the Association.
- **Seminars for farmers** are organized regularly. The scientists of Institute participate in lectures organized by the regional Departments of Agriculture and Consultation Bureaus.
- Institute organizes or participates in **fruit and berry exhibitions** in Dobele, Riga and other towns in Latvia. Our scientists provide **consultations** both at the Station and at farms.
- Every year **Farmers Days** take place at Dobele in March and August, collecting numerous visitors.

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- The DUS (Distinctness, Uniformity, Stability) laboratory works since 2001. It's task is to test and describe new fruit varieties for registration.
- At present in testing there are:
  - 6 apple varieties from **Latvia**,
  - varieties from **Estonia**: 17 apple, 2 pear, 8 plum and 17 cherry, 2 raspberry, 5 black currant.
- This year testing is finished for Estonian apple variety `Kasper`.

Lilac collection, museum

Our lilac collection was started in 1989. It consists of about 150 varieties and hybrids of breeders P. Upītis, A. Kolesnikov, V. and E. Lemoine and others.

The largest part of the collection includes varieties and hybrids of *Syringa vulgaris* L., but there are another species of late flowering lilacs as *S. josicaea*, *S. reflexa*, *S.x prestoneae* and different interspecific hybrids also.

In 1995 cultivars 'Daudzpusīgais Zemzaris', 'Esības Prieks', 'Gaiziņkalns', 'Liega', 'Maija Viešņa', 'Mazais Princis', 'Pērļu Zvejnieks' were included in the International Lilac Register in Canada.

50 lilacs selected by the breeder L. Kārkliņš were included in the collection in 2003.

In 2004 cultivars **'Ede Upitis', 'Liega', 'Maija', 'Mazais Princis', Pearl Seeker', 'Gaizins' were registered in Latvia**.

Two cultivars are now tested in Stuttgart (Germany), 6 varieties in Iowa (USA).

Lilac collection, museum

The museum was set up in 1977. The main exposition is devoted to breeder Pēteris Upītis.

Every year thousands of people visit our museum and lilac garden, especially during lilac flowering.

Since 2002 a new tradition has been organised: concerts of classical music in the garden during lilac flowering. The famous soloists of Latvian National opera as well as the best amateur choirs take part in these concerts.

Future

- Since 1995 the **number of researchers has tripled**
- **Equipment for research pusposes is renewed**

- **Main problem – no space for further development**

Project of laboratory building reconstruction:

Thank you for your attention !