PLUM RESEARCH and GROWING in LATVIA

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Plum Symposiums and EUFRIN meetings in last 20 years

VII International Symposium of Plum and Prune - Plovdiv, Bulgaria, 2001

Convener: Vasily Djouvinov

A lot of plums and Sharka! Very hot weather!
We are so young!!!!!
Conveners: Eivind Vangdal and Lars Sekse
Plums on steep montain slopes, very beautiful nature and excellent closing dinner
We are still young 😊
1st EUFRIN Plum and Prune WG meeting
Holovousy, Czech Republic, 2006

Convener: Jan Blažek
A lot of plums, but also beatiful apricots😊
IX Symposium of Plum and Prune - Palermo, Sicily, 2008

Convener: Francesco Sotille

Beatiful nature, plums, peaches – in flowering time, a lot of olives
Convener: Mihai Botu
A lot of fun and plums, of course!
And excellent dinner with songs, dances and lamb roast
Convener: Ted DeJong

Plums (not ripe), but a lot of different exotic fruits.
Long, but very interesting trips, dinner with the best steak in the world
3rd EUFRIN Plum and Prune WG meeting
Scopelos, Greece, 2015

Convener: Alexandros Papachatzis
Not so much plums, but beatiful nature, especially - Mamma Mia rock and excellent dinner with national food and dances (Sirtaki😊)
XI International Symposium of Plum and Prune - Freising, Germany, 2016

Convener: Michael Neumuller
A lot of plums, information, excellent organization – field trips, degustations, dinner in Botanical Garden, etc.
4st EUFRIN Plum and Prune WG meeting
Jelgava-Dobele, Latvia, 2018
And now - about the plums in Latvia

History

Development of fruit growing and fruit science has always been closely linked to the development of the whole country.

Fruit growing in Latvia expanded when farmers obtained their own land in the 19th century. They got knowledge about orchard management and cultivars from manor orchards.

After the founding of the independent Latvia state in 1918, fruit growing developed rapidly.

Plums are commercially grown in Latvia since 19th century.

BUT: Tree nurseries propagated mostly cultivars popular in Western Europe that proved to be poorly adapted to Latvian climate.
History: 1920-1940

Plantation areas expanded especially in 1920ties-1930ties.

- In 1935 there were 1 046 mill. plum trees, average yield 14-18 kg /tree.
- Nursery plant production - 12 th. plum trees, demand for 60-70 th. trees, but there was hortage of rootstocks.
- About 50% was landrace ‘Latvijas Dzeltenā Olplūme’, the rest – Western European cultivars.
- After the severe winters of 1939/40, 1941/42 plum areas decreased by >50%.

Reasons - lack of hardy cultivars, use of growing technologies introduced from countries with different climate.

For many fruit crops including plums, Latvia has a south-east divide. Plum cultivars which are productive and reach old age in southwest Latvia, in eastern Latvia suffer winter injury and often die.

In 19th century the following cultivars were recommended as winterhardy:
- ‘Mirabelle de Nancy’,
- ‘Mirabelle de Metz’,
- ‘Latvijas Dzeltenā Olplūme’,
- ‘Latvijas Sarkanā Olplūme’,
- ‘Green Gage’,
- ‘Perdrigon’,
- ‘The Czar’,
- ‘Victoria’.
History: 1945-1985

Development of fruit growing after World War II was greatly hindered by the abolishment of private land property, as well as loss of generation succession.

Plum research continued in several places: State Research Station in Pūre, Institute of Biology, Experimental Stations in Ogre, Jedzeni and Dobele.

Research was targeted more to yield quantity, not quality, in the framework planning system of USSR.

There were no possibilities to get Western experience, instead cooperation with other Soviet researchers developed.

Variety evaluation focus was on the needs of home gardens, as only a few new orchards were established at the state farms. To improve winterhardiness, cultivars from Russia and Estonia were introduced.
History: cultivars

Ancient landraces in Latvia are ‘Latvijas Dzeltenā Olplūme’ un ‘Latvijas Sarkanā Olplūme’. They were propagated with root suckers and also chance seedlings. The best genotypes were selected by people.

In 1950ties Institute of Biology expeditions were organized evaluating and collecting the best clones of local plums. Results:

- 2 clones of ‘Latvijas Sarkanā Olplūme’ – ‘Varakļānu’ and ‘Krustpils’, more winterhardy, with larger, better quality fruits.

- Clones of ‘Latvijas Dzeltenā Olplūme’ selected for higher productivity and larger fruits. Unluckily nurseries often propagated the hardiest clones which lack productivity.

- Research of plum fertilization biology, including hybridization of best landraces, was done by A. Spolītis. From obtained hybrids several cultivars were selected, one registered and commercially grown in Latvia - cv. ‘Lāse’.

"Latvijas Dzeltenā Olplūme"

"Lāse"
History: winterhardiness


The last extremely cold winter was in 1986/87, again close to -40°C. Very good or good hardiness had:

- **landraces** ‘Latvijas Sarkanā Olplūme’, ‘Latvijas Dzeltenā Olplūme’,
- also ‘Eksperimentalfältets’, ‘The Czar’ and ‘Stanley’.

Latvian climate demands hardy cultivars, while consumers need attractive, tasty fruits.

For this reason breeding continued in Dobele, Institute of Horticulture. In 2001 **cv. ‘Minjona’** was registered - winterhardy, but not satisfactory fruit size.
The main goals of plum breeding:

- **Cultivars adapted for growing in Latvia** (including high winter-hardiness of flower buds, resistance of trees to low temperatures and harsh temperature changes during the winter-spring period),
- **Fruit quality suitable for commercial growing,**
- **Resistance to most important diseases,**
- **Ripening during an extended period of time** (the main accent is laid on early maturing),
- **Tree habit easy for training and cultivation,**
- **High degree of self-fertility.**

In 1996 – 2001 a common domestic plum breeding program with **Swedish breeders** was carried out. As a result, from more than 100 perspective hybrids –

- **4 new cultivars were selected.**
Cultivars ‘Sonora’, ‘Adelyn’, ‘Ance’ are suitable for commercial growing in all territory of Latvia.

‘Ance’

‘Adelyn’

‘Lotte’

‘Sonora’

‘Lotte’ has tasty and good quality fruits, but its winter-hardiness is not satisfactory all in Latvia. It can be recommended for locations with the most favourable conditions.
2 new cultivars from this program applied for registration in 2016 and 2017

‘Laine’ is suitable for commercial cultivation. Excellent fruit appearance, large fruits (up to 60 g), free, small stone, taste is good. Very productive.

‘Zane’ is suitable for growing in home gardens. Visibly beautiful, juicy fruits with free stones, exceptionally good, honey-like flavor.
Important cvs. introduced from other countries last 20 years

Ave

Renklod Sovetskij

Jubileum

Zarechnaya Rannaya

Julius
Diploid (Japanese) plum cultivars

Commercially grown Russian cultivars:
‘Kometa’ (‘Kometa Kubanskaya’) – most widely grown; best in Western Latvia
‘Skoroplodnaya’ - best in Eastern Latvia

Valued for - early ripening, attractive fruits
Problem – flower bud susceptibility to winter temperature fluctuations

Short-term breeding program (1980ties-1990ties) for improved winter-hardiness did not result in cultivars of commercial value.

More: see presentation by Laila Ikase
German origin plum cultivars and hybrids (1)

Evaluation since 2008.

The first trial: 3 W.Hartmann’s cultivars (‘Tipala’, ‘Tegera’, ‘Haganta’) and three hybrids (H-5102, H-3753, H-3690).

‘Tegera’ can be recommended for Latvia because its winter hardiness in the research was good. The crown is vigorous and upright - young branches need spreading. After first trials – very good storage, good suitability to drying and canning. Average yield in 2018 – 28 kg per tree, Brix 17. Interest in ‘Tegera’ already expressed by Latvian growers!!!

‘Tipala’ in Latvian conditions had periodical production and fair taste. Vigour of the crown is medium, with thin branches. In 2018 the yield was too big! - Average yield– 15 kg per tree, Brix 16.
German origin plum cultivars and hybrids (2)

'Haganta' had very good fruit quality and no problems with pruning, but we recommend it only for warmer regions in Latvia. The crown is vigorous and semi-open. **Ripening may be too late in Latvia.** Average yield 6.5 kg per tree, Brix 18.

'Hanita' had good winterhardiness and easy to prune crown. Last 6 years it was yielding each year. Average yield **20 kg per tree, Brix 20.** Fruit quality is good. Promising for Latvian orchards.

12.10.2015. we picked up ‘Haganta’ frozen…
**H-5102** The crown is vigorous and upright - young branches need spreading. *Flowering was weak and the yield poor, fruits rather small,* only this year the crop is excellent;

**H-3753** The crown is semi open and upright. Yield among years is stable and good enough, fruit quality good, no winter damages were observed, so *it can be promising in Latvia conditions*;

**H-3690** The crown is medium vigorous and semi-open. Very easy training. Productivity is very good, fruit appearance good, *but flavour medium.*

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**H-5102** in 2017 and 2018 had fruit damages caused by *boron deficit*

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Average kg/tree</th>
<th>Brix %</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-5102</td>
<td>15</td>
<td>15.6</td>
</tr>
<tr>
<td>H-3753</td>
<td>15</td>
<td>19.2</td>
</tr>
<tr>
<td>H-3690</td>
<td>35</td>
<td>15.7</td>
</tr>
</tbody>
</table>
In 2014 new W.Hartmann’s cultivars and hybrids planted for trial at institute of Horticulture (1st yields now)

<table>
<thead>
<tr>
<th>Cultivars/hybrids</th>
<th>Brix % in 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felsina</td>
<td>22.7</td>
</tr>
<tr>
<td>Habella</td>
<td>Not ripe yet</td>
</tr>
<tr>
<td>Jojo</td>
<td>Not ripe yet</td>
</tr>
<tr>
<td>Corola</td>
<td>17.8</td>
</tr>
<tr>
<td>H-5099</td>
<td>12.5</td>
</tr>
<tr>
<td>H-7184</td>
<td>21.1</td>
</tr>
<tr>
<td>H-7286</td>
<td>21.9</td>
</tr>
</tbody>
</table>

**Azura** (Nr.7302) - not fruited yet

**Juna and Corola** - only some fruits in 2018
First crop of new German hybrids in Latvia

First yield in 2018, evaluation will be continued - may be promising in Latvia

Felsina

Habella

H-5099

H-7184

H-7286

Jojo
Research on growing technologies for plums

Rootstocks (1)

The most widely used rootstocks are seedlings of *Prunus cerasifera* Ehrh. *ssp. divaricata* C.K. Schneid., more hardy than the common myrobalan plum. These have good compatibility with most cultivars except gages, are adapted to different soil types and disease tolerant. Their drawback is a long growth season which reduces winter-hardiness of grafted cultivars; they tend to form suckers around stem.

**Hardy seedling PU-20651** (*P. salicina* ssp. *ussuriensis* x *P. cerasifera*) has been selected at the Institute, which slightly reduces tree vigour.

Testing of several Western European and Russian rootstocks (St Julian A, GF 655/2, Myruni, AP-1, SVG 11-19, OP 23-23, Druzhba) did not result in their introduction into production.
Research on growing technologies of plums

Rootstocks (2)

At present trials continue with Wangenheim rootstocks and size-reducing VVA-1, Weiwa, S766 and M633.

Preliminary results:
- The most vigorous rootstocks were *P. cerasifera* and Weiwa.
- Other rootstocks had no significant differences of vigour.
- 'Victoria' had significantly smallest trees on VVA-1;
- 'Jubileum' showed significant differences among rootstocks: VVA-1 decreased TCSA about 30%; *S 766* decreased TCSA about 15% compared with trees of seedling rootstock *P. cerasifera*.
- Higher suckering both years showed rootstocks *P. cerasifera*, S766 and M633. Cultivars influence on root suckering was not significant.
Prunus cerasifera

Weiwa

S 766

VVA 1

M633

Wangenheim
Research on growing technologies of plums

Trials of different crown shapes, their influence on productivity and fruit quality carried out (more: see presentation by Ilze Grāvīte)
Application of molecular genetic tools on plum genetics

- Gentotyping of plum genetic resources:
- Genotyping by $S_f$ (self-incompatibility) gene markers:
  - 99 plum accessions genotyped: 7 diploid and 92 hexaploid plum,
  - markers developed in different Prunus species,
  - Future development - detection of plum self-incompatibility groups by allele specific genotyping.

(Kota, Lacis, 2012)
# Plum commercial growing in Latvia

Areas of commercially grown fruit crops in Latvia

<table>
<thead>
<tr>
<th>Crop</th>
<th>Total area (ha)</th>
<th>including organic (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>2792</td>
<td>335</td>
</tr>
<tr>
<td>Pears</td>
<td>157</td>
<td>10</td>
</tr>
<tr>
<td><strong>Plums</strong></td>
<td><strong>85</strong></td>
<td><strong>8</strong></td>
</tr>
<tr>
<td>Cherries</td>
<td>128</td>
<td>24</td>
</tr>
<tr>
<td>Strawberries</td>
<td>403</td>
<td>26</td>
</tr>
<tr>
<td>Red and white currants</td>
<td>78</td>
<td>10</td>
</tr>
<tr>
<td>Raspberries</td>
<td>191</td>
<td>15</td>
</tr>
<tr>
<td>Black currants</td>
<td>70</td>
<td>213</td>
</tr>
<tr>
<td>Blueberries</td>
<td>283</td>
<td>35</td>
</tr>
<tr>
<td>Cranberries</td>
<td>141</td>
<td>5</td>
</tr>
<tr>
<td>Seabuckthorn</td>
<td>775</td>
<td>177</td>
</tr>
<tr>
<td>Japanese quince</td>
<td>221</td>
<td>65</td>
</tr>
<tr>
<td>Grapes</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Blackberries</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Gooseberries</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Aronia</td>
<td>79</td>
<td>27</td>
</tr>
<tr>
<td>Rowan (Sorbus)</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

Commercial production of plums in Latvia is relatively small; the areas are the smallest among fruit trees.
Plum production and market in Latvia

Plums are grown mostly for fresh consumption, a little – for jams, yoghurt and ice-cream additives. Fruits are sold mostly in smaller shops, markets and at farms.

Cultivars: About 20 cultivars are grown commercially.

The area of 6 most popular plum cultivars is 69% of the total plum area (‘Kometa’, ‘Victoria’, ‘Duke of Edinburg’, ‘Reine Claude d’Oullins’, ‘Skoroplodnaya’, ‘Julius’).

In the last years plantations of new cultivars developed at our Institute expand, especially the early ripening ‘Ance’. Also cultivar ‘Jubileum’ is more and more popular.

Only 2-5 cultivars are available in the supermarkets – most popular ‘Kometa’ and ‘Victoria’.
Plum production and market in Latvia


Most of the cultivars are harvested in August and beginning of September (also the most popular – ‘Victoria’).

The latest cultivars, which are possible to grow in Latvia are ‘Stanley”, ‘Grand Duke’, ‘Giant’, ripening in end of September or beginning of October.

Rootstocks, planting distances and training systems:

In commercial orchards - only on seedlings of *P.cerasifera* Ehrh. ssp. *divaricata*.

The planting distances are -3-4m x 4-5m: **500-830 trees per ha.**

Most popular crown shapes – vase and spindle.
Productivity and prices

The **productivity** in the best large orchards in Soviet times was 12-13 t/ha. As fruits were mostly grown for processing (jams, juices and compotes), prices were very low.

At present statistic data of yields in Latvia are incomplete, as well as data about the local market, because plums are sold mostly on farms and markets. Only a little share goes to supermarkets.

Questioning of the largest growers showed that the **average yield of mature trees** is:

- **20-25 kg/tree (12-14 t/ha) for domestic plums,**
- **35-40kg/tree (19-22 t/ha) for Japanese plum ‘Kometa’**

At **Institute** the **average yield is ~30 kg/tree (~20t/ha).** More productive cultivars: ‘Sonora’ (max.- 46 kg/per tree), ‘Ance’ (max. 70 kg/per tree), ‘Jubileum’ (max. 75 kg/per tree) and ‘Victoria’ (max. 67 kg/per tree).

**Price** depends on the the annual amount of yield. This year 1.3-1.7 EUR/kg sold to supermarkets. Imported plums (Poland, etc.) are cheap, and make hard competition. Selling on farm or market – from 2 EUR/kg (early cvs.) to 1 EUR/kg at high season.
Main plum diseases in Latvia

**Sharka** (*Plum pox virus*). In Latvia was found in a few cases in home gardens, none – in commercial plantations.

**Fungal diseases:**

**Plum rust** (*Tranzchelia pruni-spinosae* Pers. and *Tranzschelia discolor*) In some years spreads in commercial plantations, especially when no phytosanitary prophylaxis is done.

**Shot leaf disease** (*Wilsonomyces carpophilus* Lev.). Common in commercial orchards.

**Silver leaf disease** (*Chondrostereum purpureum*). Spreads after unfavourable winters, usually on less hardy cultivars.

**Common fruit rot** (*Monilia laxa, Monilia cinerea*). Widespread, especially in moist summers, in poorly managed orchards.
Main plum pests in Latvia

**Fruit tree red spider mite** (*Panonychus ulmi* Koch.) – there is lack of available acaricides and paraffine oil!

**Plum sawfly** (*Hoplocampa flava* L.; *Hoplocampa minuta* Christ.) – widely found in Latvia, makes impossible successful plum grown without pesticides

**Plum codling moth** (*Grapholita funebrana*) - found since 1990ties

**Plum aphids** (*Hyalopterus pruni* Geoffr.) – problematic in biological orchard, if growing without insecticides and near are growing reeds
Although at present the scale of plum growing in Latvia is small, we are optimists, because:

• In recent years areas of commercial plantations (integrated and biological) increase.

• Variety assortment changes, new, better cultivars recommended by our institute are planted.

• Growing technologies change, more attention is paid to fruit quality (in 3 commercial orchards plantations were established with modern tree support systems – espaliers).

• Consumers more often choose local fruits.

• Processing enterprises develop, which look for new ways of plum products (puree for children «Rūdolfs», dried and candied plums, gelatos, etc.)
Acknowledgements

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Thanks for your attention!