

PLUM RESEARCH and GROWING in LATVIA

Edīte Kaufmane, Ilze Grāvīte, Laila Ikase

Institute of Horticulture
Dobele, LATVIA
www.darzkopibasinstituts.lv



INSTITUTE OF
HORTI
CULTURE

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!!!!**

VIII Symposium of Plum and Prune- Ullensvang, Norway, 2005



Conveners: Eivind Vangdal and Lars Sekse

**Plums on steep mountain 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 beautiful apricots☺

IX Symposium of Plum and Prune- Palermo, Sicily, 2008



Convener: Francesco Sotille

Beatiful nature, plums, peaches – in flowering time, a lot of olives

2nd EUFRIN Plum and Prune WG meeting Craiova, Romania, 2010



Convener: Mihai Botu

A lot of fun and plums, of course!

And excellent dinner with songs, dances and lamb roast

X International Symposium of Plum and Prune- California, USA, 2012



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 beautiful 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.**



4th 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 shortage 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'.**

Perdrigon



**Latvijas Sarkanā
Olplūme**



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 Püre, Institute of Biology , Experimental Stations in Ogre, Iedzeni and Dobeles.

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

After the severe winters of 1955/56, 1978/79 plum areas decreased again. Temperature in some regions fell **even below -40°C**. Hardy survivors were: 'Latvijas Dzeltenā Olplūme', 'Viļakas', 'Perdrigon' and Estonian 'Tartu Punane',

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',
- Russian cvs. - 'Otbornij Sejaņec Eirazii', 'Volžskaja Krasavica', 'Okskaja',
- Estonian cvs. - 'Polli Viļakas', 'Vilnor', 'Liisu',
- also 'Eksperimentalfältets', 'The Czar' and 'Stanley'.

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

For this reason breeding continued in Dobeles, 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.



'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.

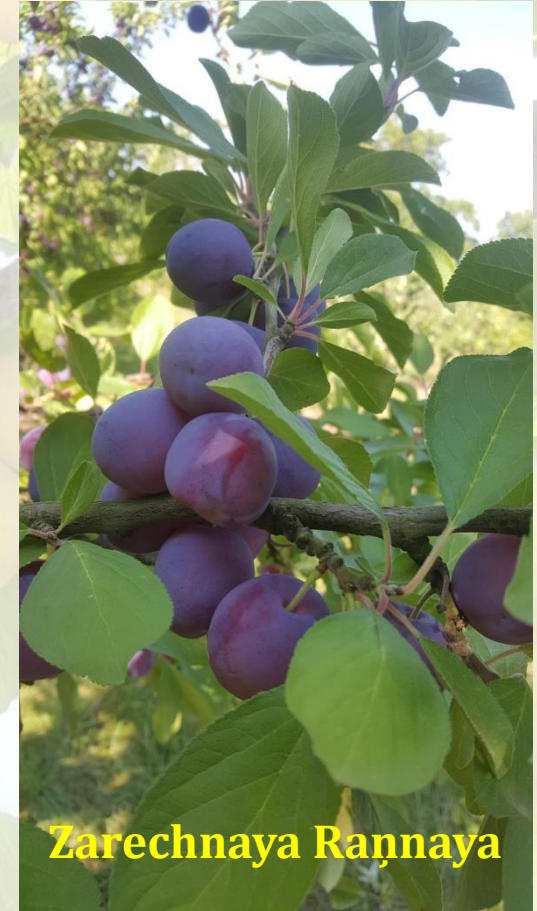
2 new cultivars from this program applied for reihstration in 2016 and 2017

‘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



Diploid (Japanese) plum cultivars

Commercially grown Russian cultivars:

‘Kometa’ (**‘Kometa Kubanskaya’**) – most widely grown; best in Western Latvia

‘Skoroplodnaya’ - best in Eastern Latvia



‘Kometa Kubanskaya’

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**.



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



Hybrid	Average kg/tree	Brix %
H-5102	15	15.6
H-3753	15	19.2
H-3690	35	15.7

In 2014 new W.Hartmann's cultivars and hybrids planted for trial at institute of Horticulture (1st yields now)

Cultivars/ hybrids	Brix % in 2018
Felsina	22.7
Habella	Not ripe yet
Jojo	Not ripe yet
Corola	17.8
H-5099	12.5
H-7184	21.1
H-7286	21.9

Azura (Nr.7302)- not fruited yet

Juna and Corola - only some fruits in 2018



**'Habella'-
planted 2014,
first fruits in
2017
ripening 2018**



First crop of new German hybrids in Latvia

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



H-5099



Felsina



Habella



H-7184



Jojo



H-7286



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:

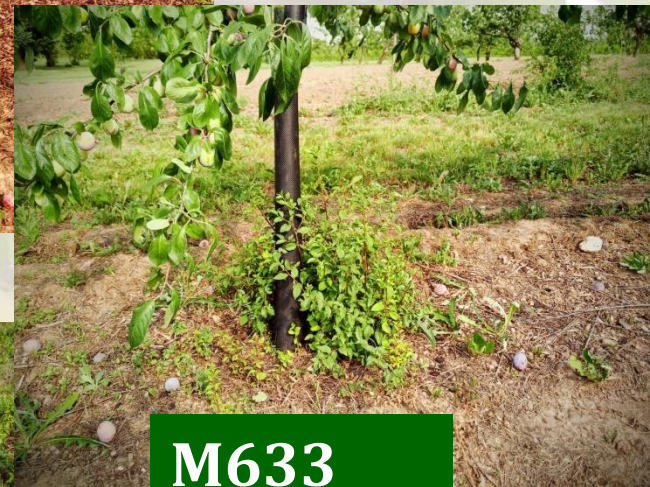
- The most vigorous rootstocks were *P. cerasifera* and **Weiwa**.
- Other rootstocks had no significant differences of vigour
- 'Victoria' had significantly smallest trees on **VVA-1**;
- 'Jubileum' showed significant differences among rootstocks: **VVA-1** decreased TCSA about 30%; **S 766** decreased 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



VVA 1



M633



Weiwa



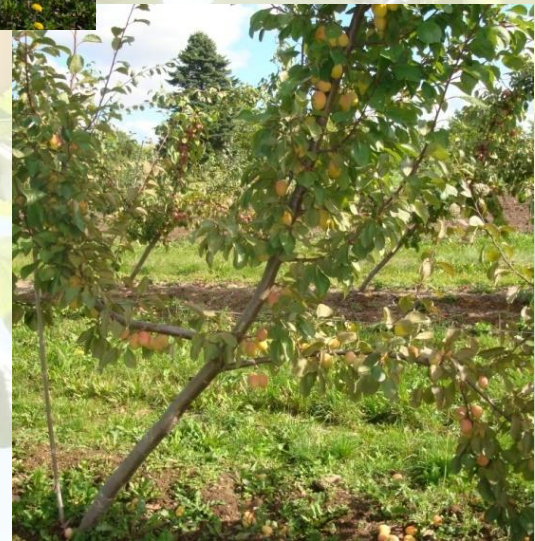
S 766



Wangenheim

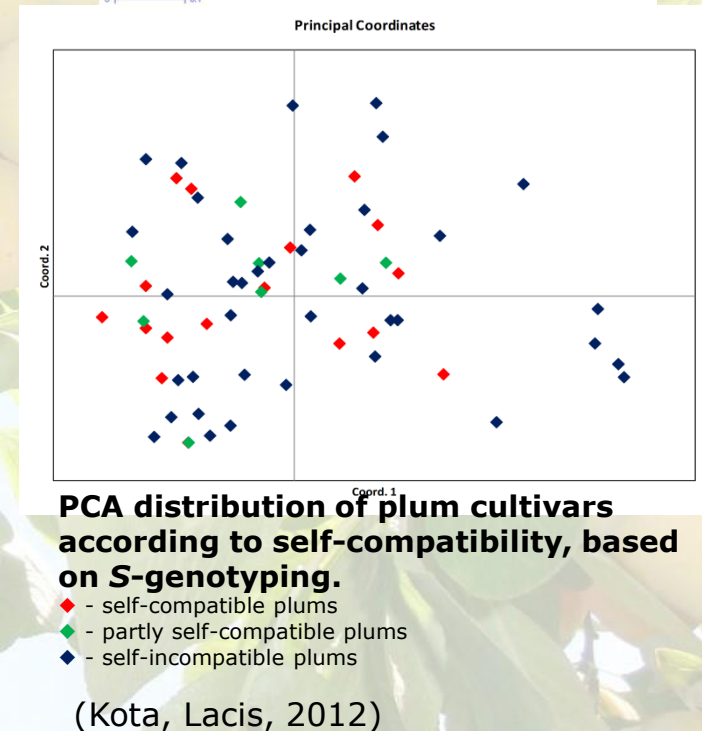
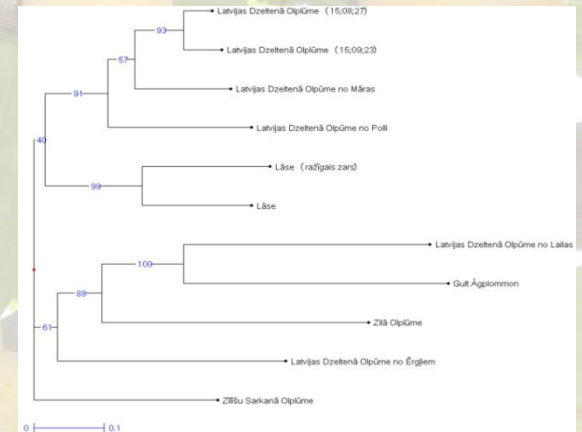
Research on growing technologies of plums

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:
 - Clonal differentiation and identification of cvs. 'Latvijas Dzeltenā Olplūme', 'Lāse' and different Eggplums.
- Genotyping by *Sf* (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.



Plum commercial growing in Latvia

Areas of commercially grown fruit crops in Latvia

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

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

The main plum season in Latvia starts in the end of July (diploid plums and some domestic plums – ‘Aleinaya’, ‘Polli Varane’, ‘Ance’, ‘Startovaya’).

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 (*Tranzschelia 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 «Rūdolf», dried and candied plums, gelatos, etc.)



Acknowledgements

Research of plums was supported by Project “Investigation of apple, plum and cherry cultivars and rootstocks suitability and development of technologies for sustainable farming in different regions of Latvia” financed by the Latvian Ministry of Agriculture.



Thanks for your attention!