



**3rd meeting
of the Section of Agronomy
and Physiology of EAPR**
Riga, Latvia September 26-29, 2016



Institute of
Agricultural Resources
and Economics

RESEARCH ON POTATO IN LATVIA

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Summary

- *Potato crop appearance in territory of Latvia*
- *Need for research activities*
- *Establishment of agricultural research institutions*
- *Research direction in Latvia before WW II*
- *Activities in frame of Soviet Union*
- *Searches of research trends nowadays*



LATVIA



Latvija

- Territory 64 589 km²
- Population 2 217 053

- Agricultural land 1.9 mil. ha
- Organic agricultural land
- 207 600 ha 11 % from AL

Potato area – 27 300 ha (2014)



Potato crop appearance in territory of Latvia

1673



Duke of Curland Jēkabs



18 century
Russian Tsar Peter 1st

First initiatives for agricultural education, 19. century

- Abolition of serfdom in territory of Latvia (1817 – 1861)
- Desire to get profit from agricultural production
- Special trials for evaluation of crop varieties
 - In Priekuli manor – *J.Krēsliņš – potato and cereals 1838.*
119 potato varieties – documented in Tartu – Report on Vidzeme Agriculture
- Latvian students in Universities of Russia and European countries

Development of agricultural research institutions

- Organizing of different unions:
 - Rīga Latvian Society
 - ...
- Establishment of Rīga Central Agricultural Society (1906)
- Establishment of agricultural education institutions
 - 1863 - Department of Agriculture at Riga Polytechnic Institute (higher education)
 - Local agricultural courses and schools for local farmers
- Research and education centre in Priekuli:
 - Winter courses of Agriculture - 1910
 - Agricultural Machinery Testing Station – 1911
 - Meteorological station – 1912
 - Baltic Crop Pest Control Institute – 1913
 - **Priekuli Plant Breeding Station - 1913**

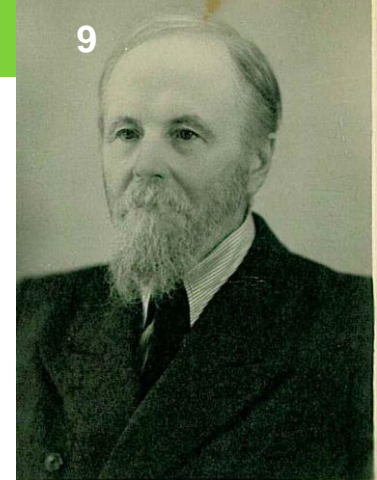


Establishment of **Latvia** state - 1918.

- World War I
- Establishment of Latvia Republic
 - Agraral land reform
 - Potato seed material export to European countries (France, Spain, Portugal, Italy, Lithuania)



Pēteris Knape (1872-1960)



- Year 1913 - Started potato breeding using hybridisation between cultivated and wild species.
- Introduction of resistance to diseases in new varieties.
- Received samples of wild species from Chile, Argentina, Ekvadora etc., described, and sent this material it to **Vavilov Plant Institute** (Soviet Union).

Solanum chacoense f. ***knappei*** Juz. et Buk.

- Potato variety 'Vāle'



Potato research carried out by scientific or experimental institutions 1920 - 1940

- Potato varieties evaluation
 - *Priekuli, Stende, Jaungulbene, Pēterlauki, Bulduri, Vecauce*
- Development of new varieties - *Priekuli*
 - *Breeder Erihs Knape and others (since 1931)*
- Seed potato production (*E.Knape*)
- Plant protection techniques
 - *Baltic Crop Pest Control Institute, Priekuli*



Research on potato during time of Soviet Union (1944 – 1991)

• **Potato breeding**

- *Priekuli (all period)*
- *Lejaskurzeme Experimental Station (1946-1953)*
- *Stende Plant Breeding and Experimental Station (1948-1953)*
- *Soviet Union Alcohol Production Research Institute, Latvian Zonal Potato Breeding and Experimental Station at Carnikava (1948-1963)*

• **Methods:**

- hybridisation between species and cultivars
- vegetative hybridisation
- mutagenese (chemical, radiative)



Research on potato during time of Soviet Union (1944 – 1991)

Vilis Gaujers and team (E.Pētersons, N.Ķesa, M.Oša, G.Bebre)

- developed equipment, buildings for wide range breeding
- theoretical base for targeted potato breeding
 - Varieties: Gauja, Agrie Dzeltenie, Madara, Brasla, Imanta etc.

Alberts Saulīte

- breeding using mutagenesis (physical and chemical)
 - Varieties: Mutagenagrie etc.



Research on potato during time of Soviet Union (1944 – 1991)

- **Research on potato diseases** in collaboration with research institutes in SU
 - late blight and other – Priekuli (N. Ķesa, M.Oša, G.Bebre etc.)
 - bacterial diseases (Plant Protection Institute)
 - viruses –Laboratory of plant and insect viruses diseases at LAA (U. Miglavs, I.Damroze etc.)
- **Development of seed production system** starting with tissue culture
(U. Miglavs etc.) 1985.



Research on potato during time of Soviet Union (1944 – 1991)

Research on growing technologies – Priekuli, Latvia Academy of Agriculture

- crop rotation
- fertilisation
- tillage
- applying of pesticides



Technology of potato production
– Priekuli, Institute of Agricultural Mechanisation

Research on potato production economical efficiency – (V.Pirksts and others)



Research trends nowadays

- Restoration of independent Latvia state – 1991.
- Entrance in EU
- Changes of potato market
- Competition with Europe and World companies



Research trends nowadays

Collaboration between research institutions –

Priekuli, LU Faculty of Biology, Institute of Biology, LUA Faculty of Food Technology

Potato breeding

- applying of newest methodology - molecular biology
- development of new evaluation methods, using NIR technologies
- breeding methods for organic farming
- specific traits for human health determination in breeding material
-

I.Skrabule, I.Mežaka, N.Rostoks, D.Grauda, I.Mūrniece etc.

Distribution of breeding clones with detected resistant and susceptible alleles of R1 and R3 genes, 2010

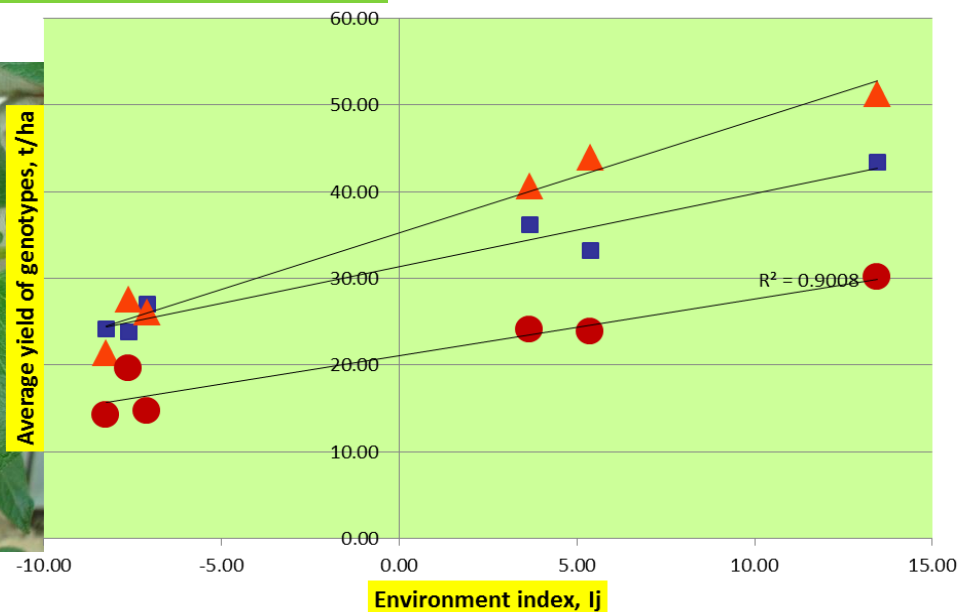


Resistance to patotypes of *Phytophthora infestans*

R1, R3a genes
RPI blb2

Resistance to patotypes of *Globodera rostochiensis*

H1 gene - MAS CP113 and 75R



Yield stability in different environments

- S 03067-33
- ▲ Prelma
- Imanta
- Lineārs (S 03067-33)
- Lineārs (Prelma)
- Lineārs (Imanta)

Research trends nowadays

Priekuli in collaboration with

The Latvian Gene Bank of Cultivated Plants

- Research and maintenance of potato genetic resources

I.Skrabule, D.Rungis, A.Zhuk

I.Dimante



Research trends nowadays

Collaboration of

Priekuli with LUA – Faculty of Food technology,

- Evaluation of significant for human health substances in potato production (vitamins, glycoalkaloids, reducing sugar, amino acids etc.)
- Development of recipes for innovative food products
- Research on technological process on potato products quality
- Investigation of side product (waste) potential

*I.Mūrniece, Z.Krūma, A.Ruzaiķe,
S.Kampuse etc.*



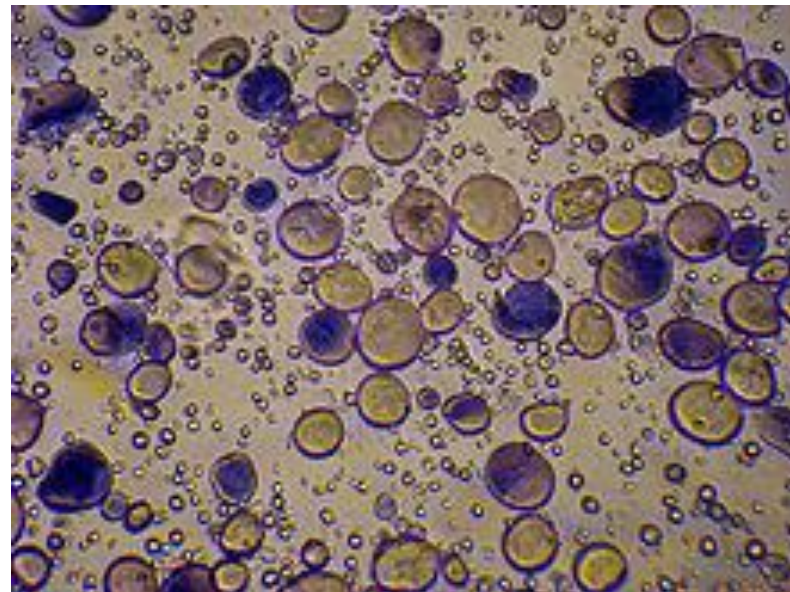
Research trends nowadays

- Collaboration of

Priekuli with LU Faculty of Chemistry

- Evaluation of different substances in potato (phenolic compounds, starch compounds, microelements etc.)

I. Jākobsone and students



Research trends nowadays

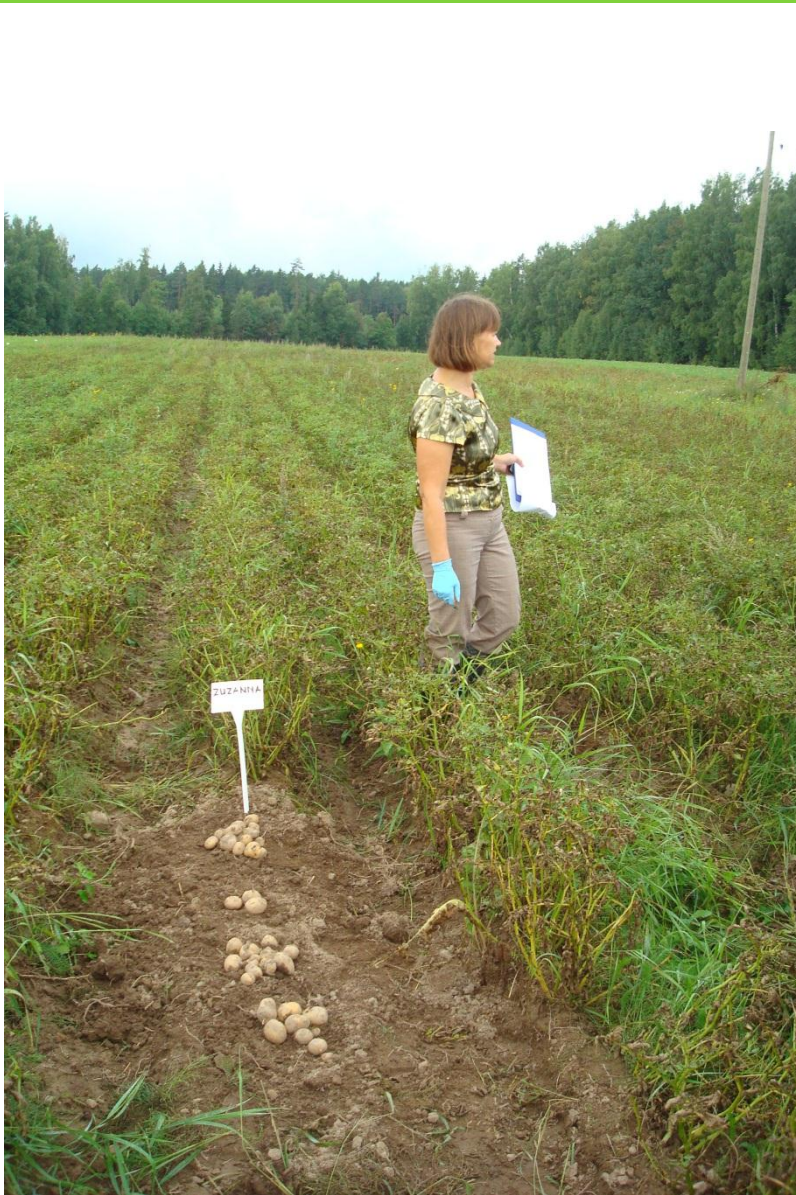
Collaboration of

Priekuli with AREI Stende, LUA, Estonian Crop Research Institute producers (Aloja Starkelsen, Biolat, Bioefekts, GreenOK etc.)

Advisers and producers associations

- Development of growing technologies for organic and integrated farming
- organic potato starch production, variety evaluation etc.
- Application of organic preparations in potato production
 - application of Microbiological and plant extract preparation application
 - preparations from coniferous needles extract
 - peat extract
 - Biohumus - vermicomposts
- detection of optimal fertilisation for potato production

A.Ruža, L.Vojevoda, L.Zariņa, A.Pogulis, T.Tahtjarv etc.



Microbiological and plant extract
preparation application
bacterial preparations containing
Trichoderma sp.
Streptomyces sp.
Azotobacter spp. etc
preparations from coniferous needles
extract
vermicomposts
peat extracts

Research trends nowadays

Priekuli

- Potato seed production for organic and integrated farming systems
 - application of microbial and other organic substances
 - pre-sprouting effects
 - improvement of initial seed material production (PBTC)

I. Dimante, A. Gābere, I. Skrabule



Research trends nowadays

- *Priekuli in collaboration with Estonian University of Life Sciences, Latvia Plant Protection Centre, Vavilov Plant Production Institute (Russia), LUA Faculty of Agronomy, Danish Institute of Agricultural Sciences*
- Potato diseases pest distribution and evaluation
 - late blight virulence, structure of mating type
 - fungal diseases during storage
 - Potato pests
 - Viruses and aphids

Implementation of NegFry DSS system
in late blight control

I.Turka, G.Bimšteine, N.Zoteyeva etc.



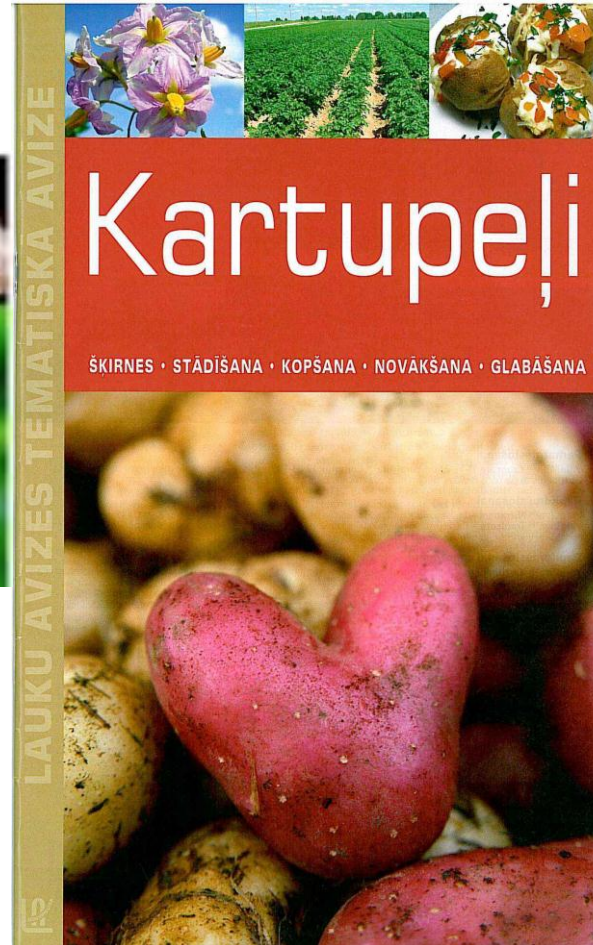
Disemination of research results

TV chanel



Dissemination of research results

- Publications



Dissemination of research results

- Exhibitions and fairs







Welcome to Priekuli!

www.arei.lv