Estonian
Crop Research
Institute

Estonian Crop Research Institute – experiences and challenges to meet the needs of the agriculture in the future

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- **An overview about Estonian Crop Research Institute**
- **Challenges of breeding for the future**

State institute

Estonian
Crop Research
Institute

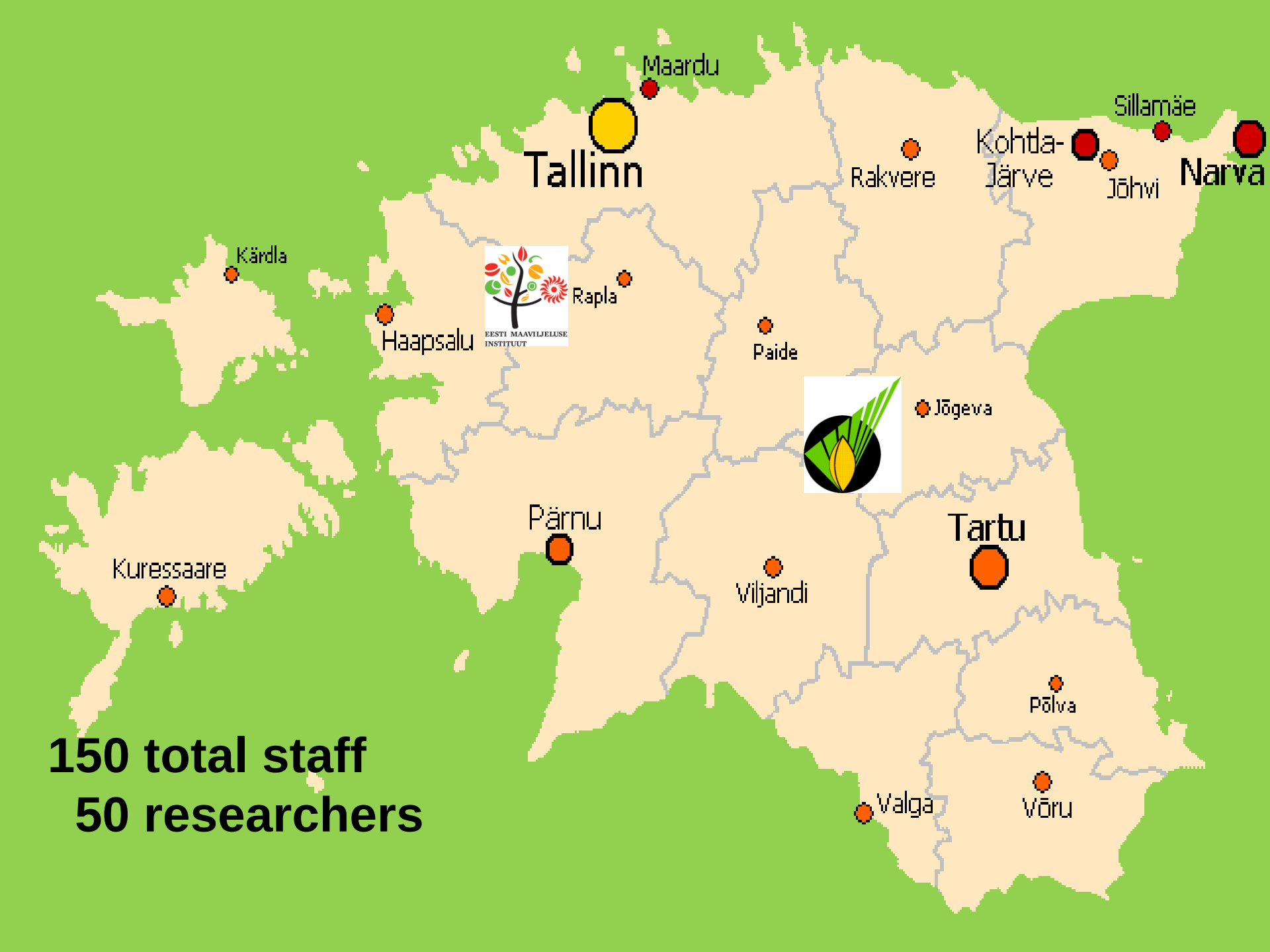
1st July 2013

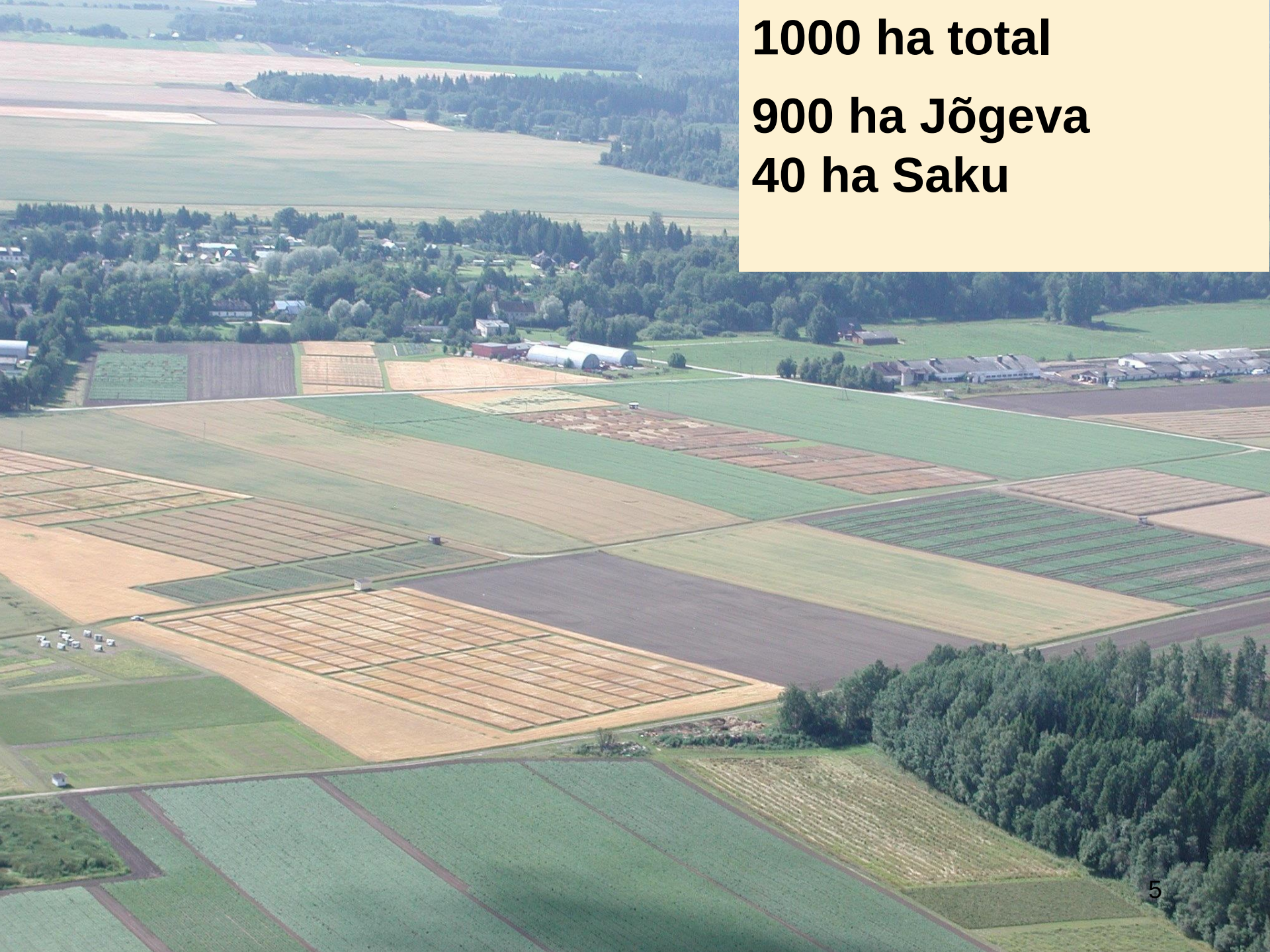
Jõgeva Plant Breeding Institute

Estonian Research Institute of Agriculture

ESTONIAN RESEARCH
INSTITUTE OF AGRICULTURE

Jõgeva Plant Breeding 1920


Maardu
Tallinn
Sillamäe
Kohtla-
Järve
Narva
Rakvere
Jõhvi
Kärdla
Rapla
Haapsalu
EESTI MAAVILJELUSE
INSTITUUT
Paide
Jõgeva
Pärnu
Tartu
Kuressaare
Viljandi
Põlva
Valga
Võru
150 total staff
50 researchers



1000 ha total

900 ha Jõgeva
40 ha Saku

Jõgeva

45 – 50 ha trial area

18 – 20 000 trial plots

Applied and basic studies

- Plant Breeding
- Agro-technology;
- Plant protection and plant health;
- Agrometeorology.

Complementary activities

- **Preservation of plant genetic resources;**
- **Maintenence breeding**
- **Seed production**
- **Sharing of knowledge**

Variety breeding and maintenance breeding

Breeding programs on:

- **Cereals**
- **Oilseeds**
- **Forage grasses and legumes**
- **Potatoes**
- **Vegetables**

- **85 varieties in Estonian Variety List in 2019 (all in EU Common Catalog)**

Cultivation in Latvia, Lithuania, Finland, Sweden, Norway, Russia, Japan

Agro-technology

Soil cultivation, fertilization, Crop rotations, catch crops, bioactivators etc

Agrometeorology

Plant protection and pathology

Development of integrated plant protection

Study of plant pests and diseases

Gene bank

Coordination of the National Program "Preservation and maintenance of plant genetic resources for agriculture in Estonia"

Long term *ex situ* preservation of 3000 accessions from 58 species in the genebank

Jõgeva Seed Centre

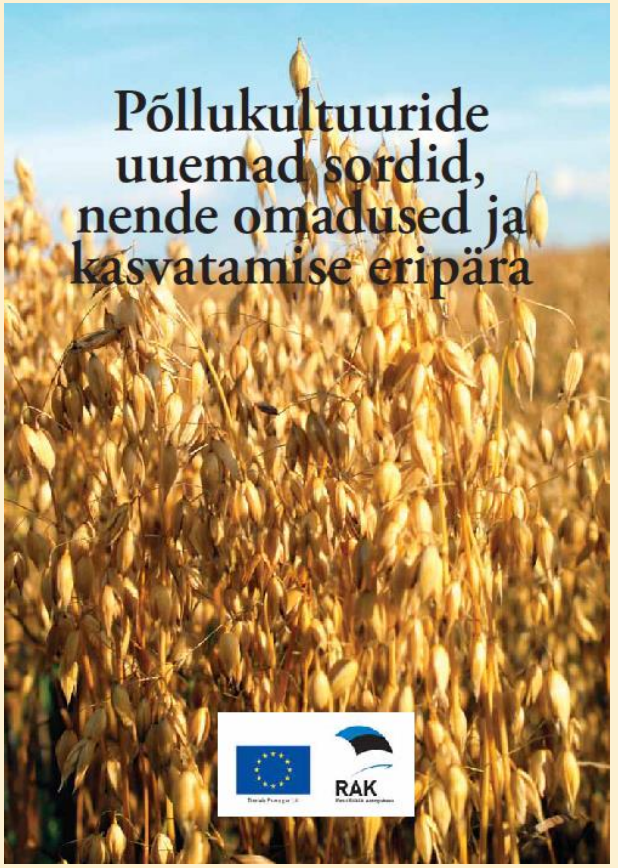
Seed production of:

- **Cereals**
- **Oilseeds**
- **Grasses**
- **Potatoes**
- **Vegetables**

Sharing of knowledge

Field days

Publications



Seminars

Sharing of knowledge

State knowledge dissimination programs (2016–2020):

- **for organic agriculture (720 000€)**
- **for conventional agriculture (1 3000 000€)**

- **one new program for both types of agriculture 2021..**

Sharing of knowledge

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Plant breeding:

present situation

State plant breeding program 2010-2019

- **Stable (but low) financing**
- **low investments to**

  infrastructure

  field technique

  laboratory equipment

Cereal breeding

Spring wheat

Winter wheat

Spring barley

Winter rye

Oat

Breeding protein and oil crops

Winter turnip rape

Soya bean

Legumes

red clover,
lucerne
white clover
alsike clover
fodder galega
white sweetclover
large leaved lupine

Grasses

perennial ryegrass
timothy
meadow fescue
red fescue
sheep’s fescue
italian ryegrass
crested hairgrass
kentucky bluegrass
etc.

Potato

Vegetables

Tomato

Garden pea

Plant breeding:

future prospects and challenges

State plant breeding program 2010-2019

- **Stable (but low) financing**
- **low investments to**

  infrastructure

  field technique

  laboratory equipmet

New cereal breeding center (2019)

New cereal breeding center (2019)

1,1 milj for equipment

2019/8/6 17:02

Development plan of Estonian agricultrure and fisheries 2020-2030

Plant breeding

- **Local adapted varieties are important for adaptation to climate change; has a potential to increase the profit of the farmers**
- **Long-time breeding program will be continued**
- **Using of sertified seed should be increase**
- **Protection of breeders rights should be improved**

State plant breeding program 2020-2030

- **Stability**
- **Improved financing**
- **Breeding of all the present crops continued**
- **Breeding of the new crops: field pea and bean, spelt**
- **Research of the new crops: winter barley, chicpeas, lentil, hemp, buckwheat**
-

Future challenges of breeding

- More extreme weather conditions
- Increase of precipitations
- Longer growing seasons
- Milder winters

Future challenges for breeding

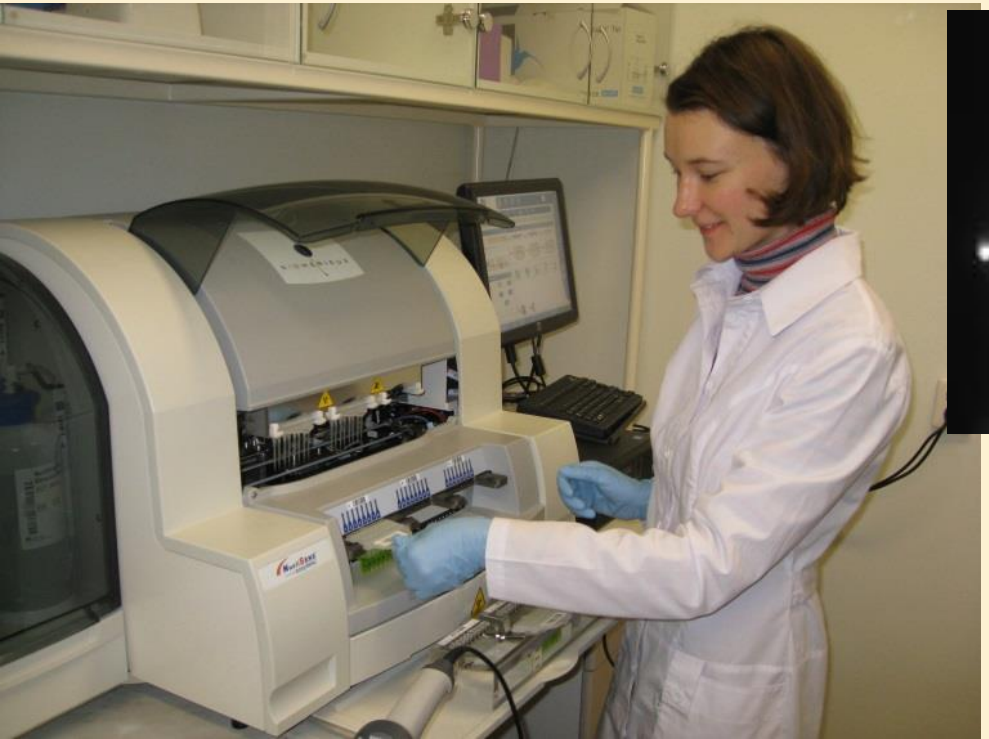
- More intensive spreading of diseases
- Heavy drought periods
- Lodging
- Increase the share of winter crops
- New crops
- Production for specific purposes
- Increase of organic management

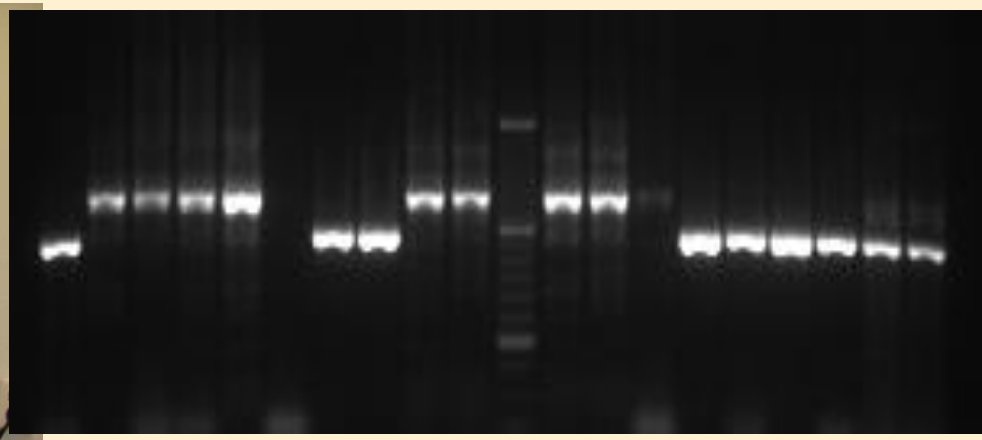
Future challenges of breeding

- **New technologies**
- **Collaboration**
- **Market research**

Implementation of biotechnology methods

Development the department of plant biotechnology in ECRI. Wider use of marker-assisted selection; double haploid method etc





Marker-assisted selection for resistance to powdery mildew of barley

Improved Mooni

Collaboration to Tallinn Technical Yniversity: Improving the resistance to powdery mildew of the variety ‘Mooni’

Drought resistance

Special trial area to ECRI for testing the drought resistance

Drought resistance

- **Collaboration project to Tartu University:** Detailed functioning of abscisic acid perception-signaling network in stomatal guard cells
- **Main aim:** study of the plant drought resistance mechanisms, improving the drought resistance of barley

Drought resistance

Collaboration to Tartu University to improve the drougth resistance

BARISTA

- **ERA-NET project: Advanced tools for breeding barley for Intensive and SusTainable Agriculture under climate change (BARISTA)**
- **Main aim: creation of barley breeds of high tolerace to stress conditions**

BARISTA trial in midsummer in ECRI

Plant breeding by group selection

Collaboration project to Tartu University

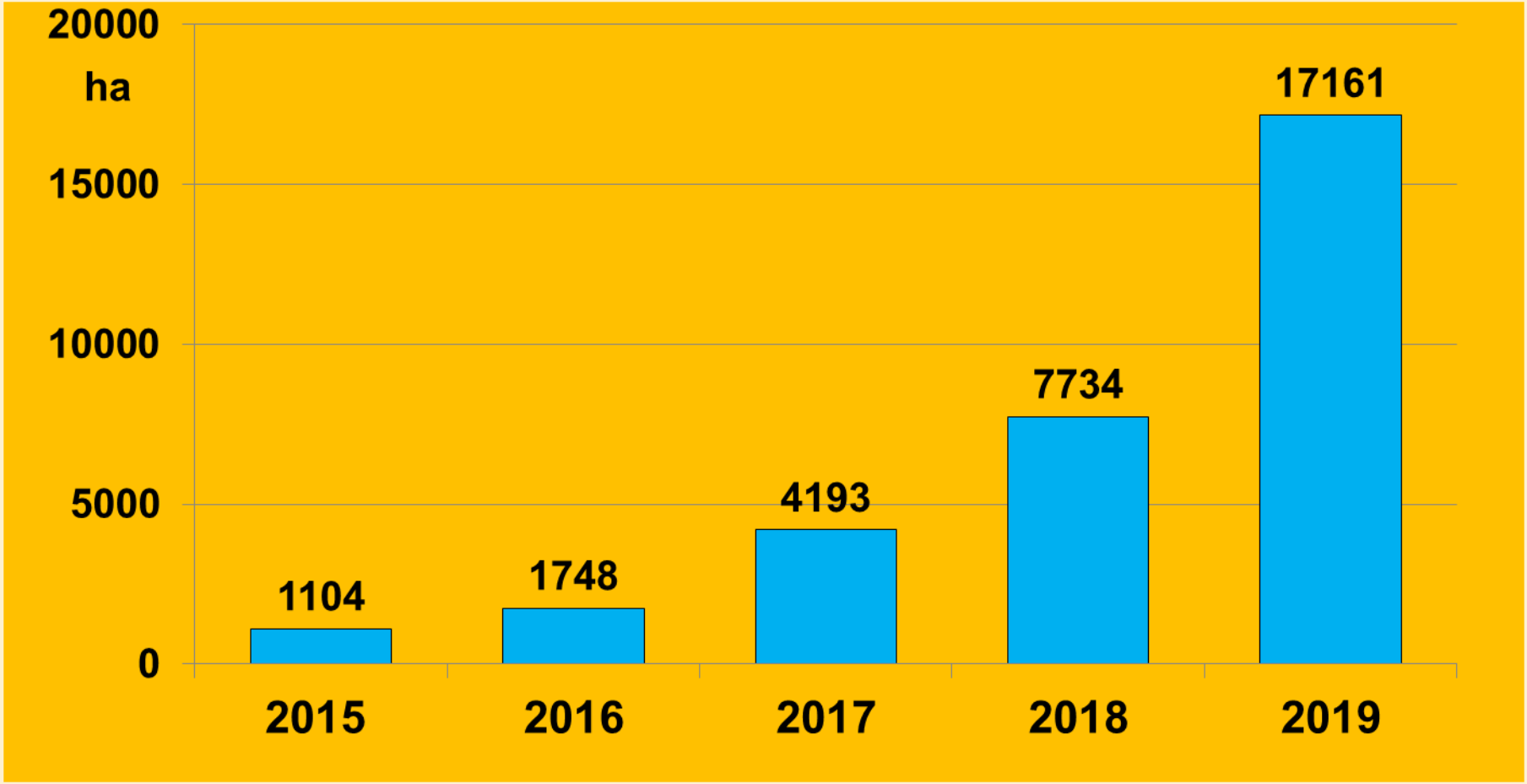
ERA-NET project RYE-SUS (2019-2022)

- **RYE-SUS**: Development of lodging-resistant and climate-smart rye – a contribution to a sustainable cereal production in marginal environments
- **Main aim:** material for breeding of high yielding an quality hybrid rye variety will be available for all partners

ERA-NET project RYE-SUS (2019-2022)

ERA-NET project RYE-SUS (2019-2022)

Winter barley



Hullles barley

Collaboration breeding to AREI

(Linda Legzdina)

Winter oat

Hemp

- **Perfect Plant**
- **Products: oil, protein, flour etc**

- **Breeding program?**
- **Long growing season**
- **Acreage: 10 000 ha in 2017**

Dwarf tomato

- **Click & Grow**
- **Indoor gardens (smart boxes)**

Oat and pea for milk and meat

- **Estonian University of Life Sciences**
- **Center of Food and Fermentation Technologies**

- **Oat for milk**
- **Oat and pea for meat**

Naked oat

EstMalt: **germinated&fermented oat grains**

Sunflower ?

Corn ?

Demands for future breeding

- **Hemp breeding**
- **Dwarf tomato**
- **Hulless barley**
- **Winter barley**
- **Winer oat**
- **Sunflower**
- **Corn**

Increase of organic trials

Organic oat for food

- **Good Yield ability in case of lower nutrient supply**
- **Weed suppression ability**
- **Disease resistance**

- **Grain quality:**
  - **dehulling ability**
  - **bright grains**
  - **volume weight**
  - **low husk content**

Enlargement the collections

More attention to the resistance breeding

Thank you for attention!