



The Institute for Breeding Research on Fruit Crops Dresden Pillnitz at a glance

The Julius Kühn-Institute (JKI)

The Federal Research Centre for Cultivated Plants in Germany

JKI is both a research institute and a higher federal authority

Constituted in 2008, as the research branch of the German Ministry of Food and Agriculture (BMEL)

Emerged from three prestigious research institutions:

- Federal Biological Research Centre for Agriculture and Forestry (BBA)
- Federal Centre for Breeding Research on Cultivated Plants (BAZ) and
- Two institutes of the Federal Agricultural Research Centre (FAL)



Julius Kühn (1825-1910)

Moto, tasks and major fields of research

Moto: „Securing tomorrow’s resources“

Tasks:

- Policy advice
- Scientific Assessment
 - Pesticides
 - Agricultural equipment
- Research

Major fields of research:

- Plant genetics, breeding research
- Plant nutrition, agronomy and soil science
- Plant protection and plant health



General Organization of JKI



Head office: Quedlinburg

17 specialized institutes at 10 locations + several service units

Total budget: ~90 million €

Staff: ~1,200

Scientists: ~300



Who are we?

The Institute for Breeding Research on Fruit Crops

One of 17 research institutes of JKI

Our core expertise

- Collection, preservation, and evaluation of fruit genetic resources
- Breeding of new cultivars for sustainable and environmentally friendly fruit production
- Development of innovative breeding methods

Part of the scientific community (national and international level)

Coordination Centre of the German National Fruit Genebank

Where are we located?



Our facility

- Administration and scientific laboratories
- Glasshouse (~1,600 m²)
- Experimental field (~45 ha)
- Storage facility

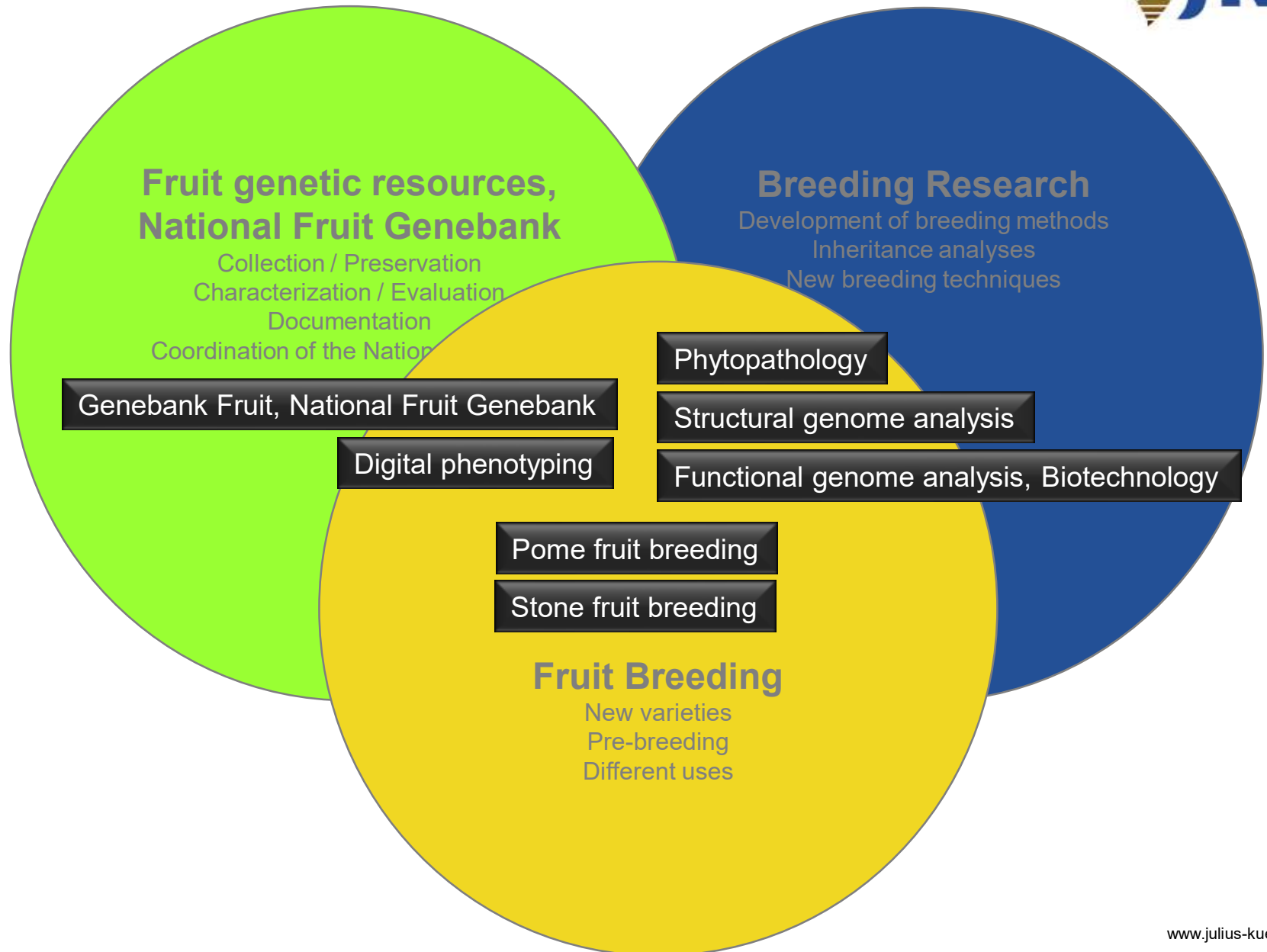


Our mission?

- Expert advice of the Ministry
- Breeding of fruit crops
- Development of innovative methods
- Preservation of biodiversity



What are our fields of action?





Genebank Fruit, National Fruit Genebank



Ex situ preservation

- 1,375 cultivars
- 1,112 wild species accessions
- 2,195 seedlings

In situ conservation measures

- *Malus sylvestris*
- *Pyrus pyraeaster*

Cryopreservation

German National Fruit Genebank

- 7 species-specific sub-networks
- 51 collections





Digital phenotyping



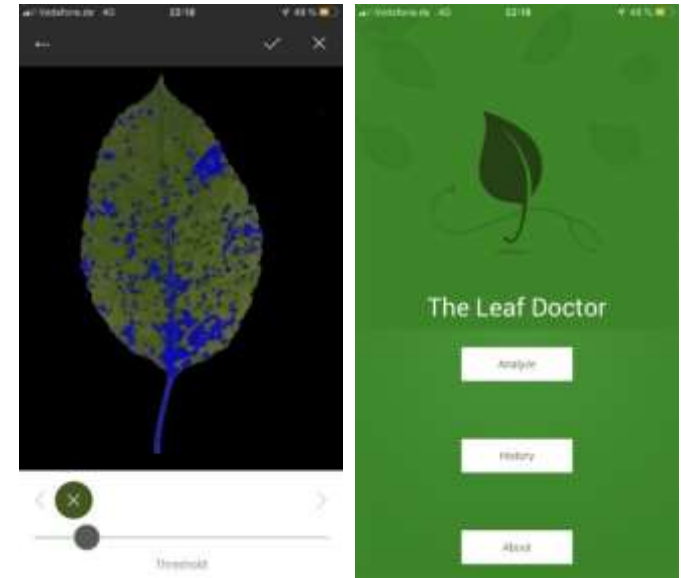
Establishment of existing tools

Collaborative development of new tools (digital, sensor based)

- Yield
- Flowering
- Diseases

Utilization for evaluation

- Genetic resources
- Breeding research



The Leaf Doctor: smart phone application for leaf disease estimation



Phytopathology



Isolation and identification of pathogens

- Establishment of pathogen collections
- Pathogen characterization



Development of screening assays

Evaluation for resistance to pathogens

- Genebank collections
- Breeding material



Host-pathogen interactions

Diagnosis of viral infections

- Strawberry
- Raspberry





Structural genome analysis



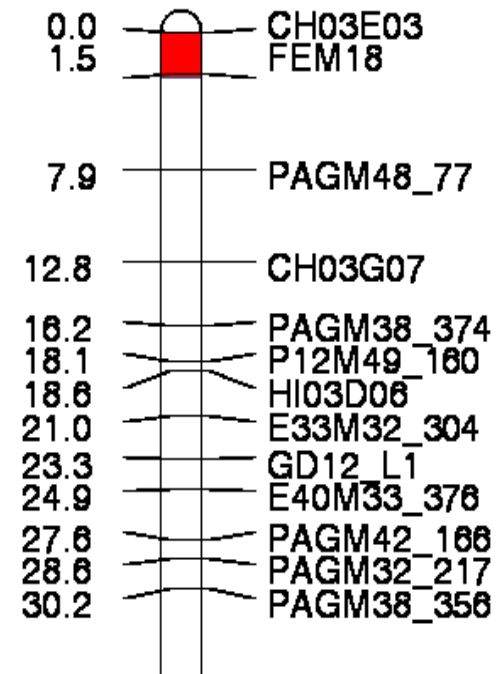
Genotyping of genetic resources and breeding material

- Different fruit species
- Different purposes (trueness-to-type, pedigree analyses, phylogenetic distance analyses)

Genetic linkage mapping, QTL-mapping, gene identification

Marker assisted selection

Genome wide selection, ... association





Functional genome analysis



Functional gene studies (overexpression, RNAi, CRISPR/Cas)

- Resistance (fire blight, scab)
- Bud dormancy
- Flower development
- Secondary metabolism, allergens

Development and establishment of new tools

- Rapid Cycle breeding
- Genome editing
- Mapping-by-sequencing based gene discovery





Pome fruit breeding



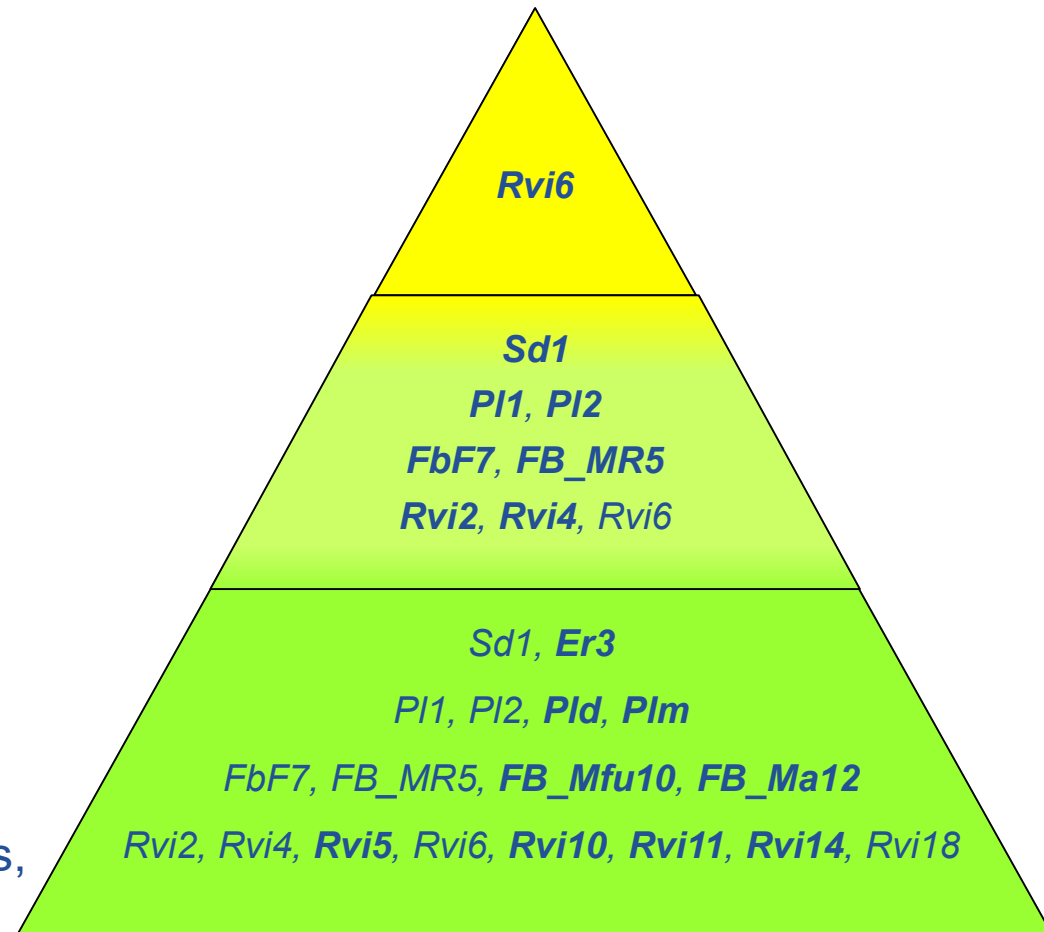
Breeding of apple and pear

Traits for the industry

- Yield, quality, firmness
- Disease resistance
- Harvesting time, storage

Traits for consumers

- Size, shape, colour, appearance
- Taste, aroma, ingredients, texture
- Health value



Major aim: Broaden the basis of resistance



Stone fruit breeding



Sweet and sour cherry, *Prunus* hybrids

Rootstock evaluation

Traits for the industry

- Fruit: quality, shelf live, fruit set, cracking
- Resistance, tolerance
- Ripening time
- Self-fertility, fertility
- Mechanical harvest

Traits for consumers

- Size, shape, colour, appearance
- Taste, aroma, ingredients and texture



Areko



Habunt



Achat



Boas



Thanks for your attention!