ForKa Projektbüro

Spuds, Spores and Potato Dumplings: Aligning Breeding Objectives within the Organic Potato Value Chain

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Gefördert durch:
Bundesministerium für Ernährung und Landwirtschaft
aufgrund eines Beschlusses des Deutschen Bundestages

LfL Bayerische Landesanstalt für Landwirtschaft

JKI Julius Kühn-Institut

IPK LEIBNIZ-INSTITUT

Naturland

Bioland

BÖL BUNDESPROGRAMM ÖKOLOGISCHER LANDBAU

Potato Breeding for Organic Farming

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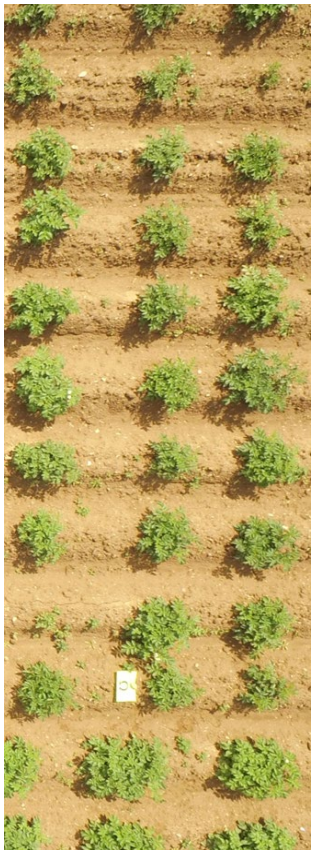

Bio Strategie 2030:

30 % Organic Farming until 2030

small range
of suitable potato varieties

- ➢ Resilient against:
  - heat and draught stress
  - pathogen
- ➢ fast youth development to suppress weed growth
- ➢ nutrient efficiency
- ➢ Sturdy growth

Late Blight and Alternaria in Organic Farming

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Late Blight

breeding programme
and intensive
molecular research

risk diversification

range of varieties
different locations

Soil management

crop rotation
good nutrient availability
microorganisms
mulching

plant protection

Resilient varieties

nutrient efficiency
stress resistance
pathogen resistance

Early Blight

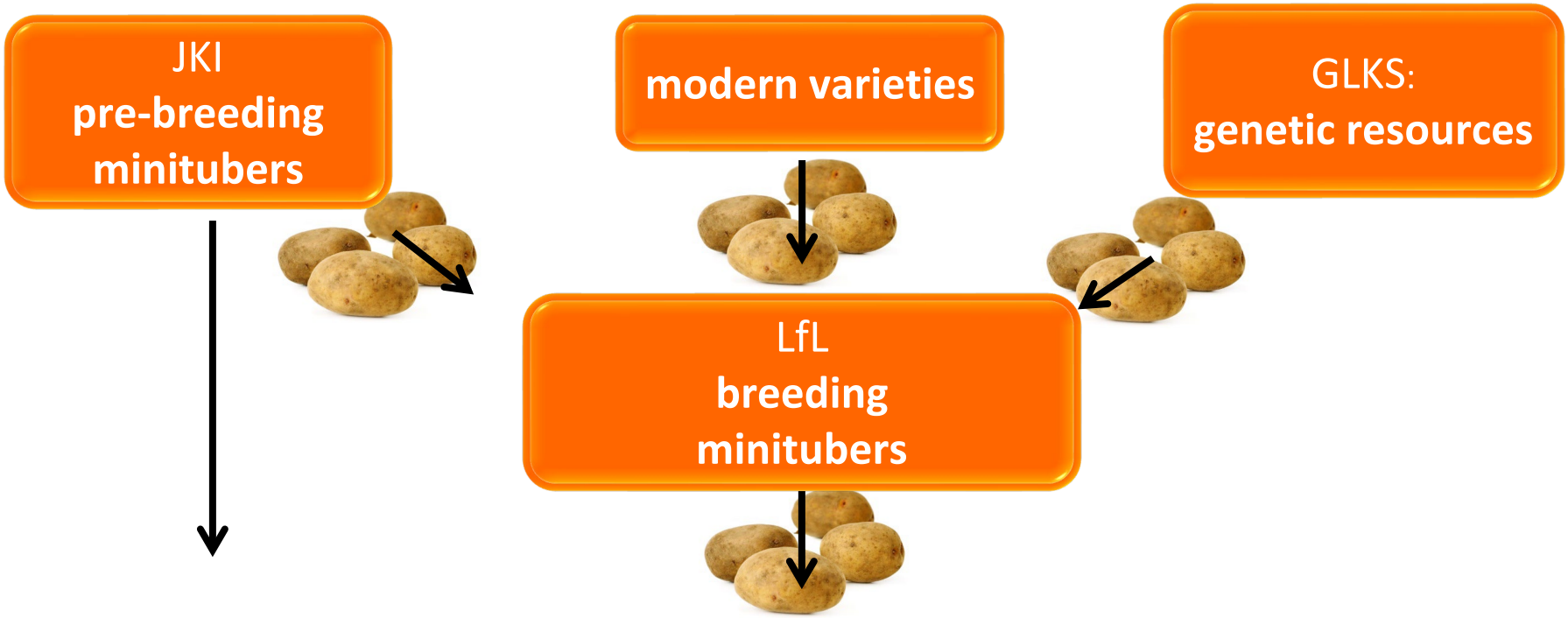
NO
breeding programme

Projects since 2012

ForKa Projektbüro

	Ökokartoffel	Effikar	Karola
Duration	2012-2018	2019-2024	2024-2029
Goal	**Suitability for Organic Farming**		
Breeding	**Food quality** **Pi resistance**	**Food quality** **nutrient efficiency** **Pi resistance**	**Food quality and processing** **Pi resistance**
Goal	**Pi-Resistance**	**nutrient uptake**	**stress response**
Research	**Screening of phenotypes and genotypes**	**Nutrient efficiency, root and shoot development**	**Heat stress response, eGWAS Pi resistance**

Participative Breeding Programme



ForKa and organic farms:
cultivation, assessment and selection

Late Blight Resistance: JKI Prebreeding

S. demissum

S. andigena

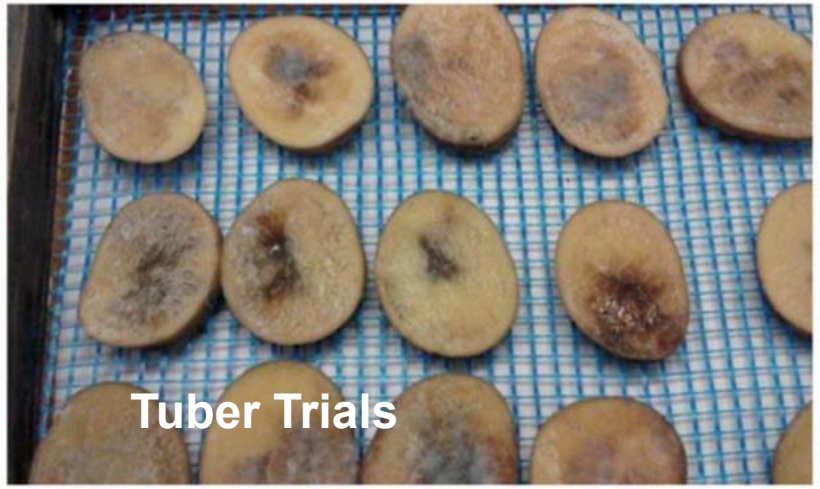
S. bulbocastanum

S. pinnatisectum

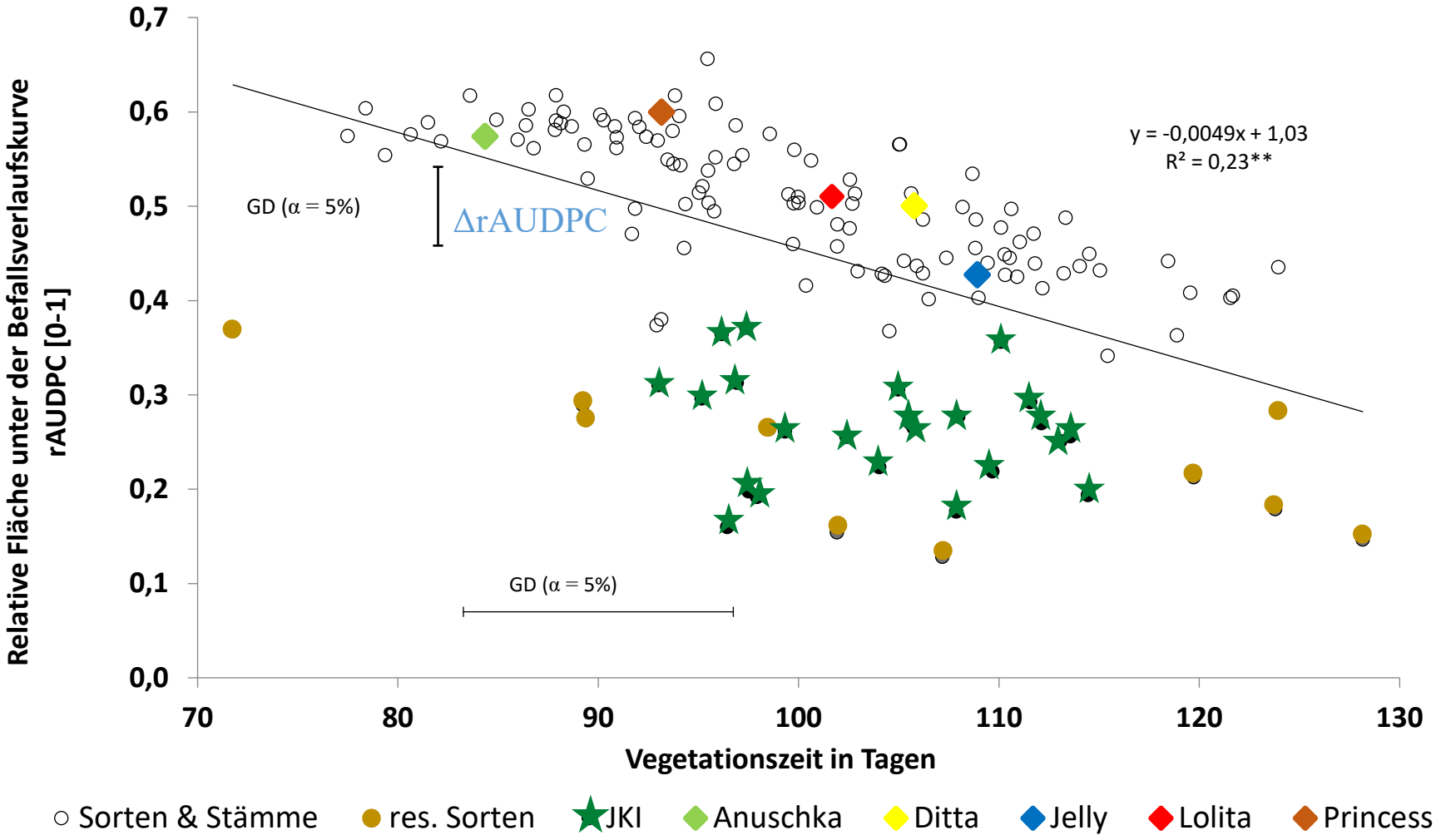
S. phureja

S. stoloniferum

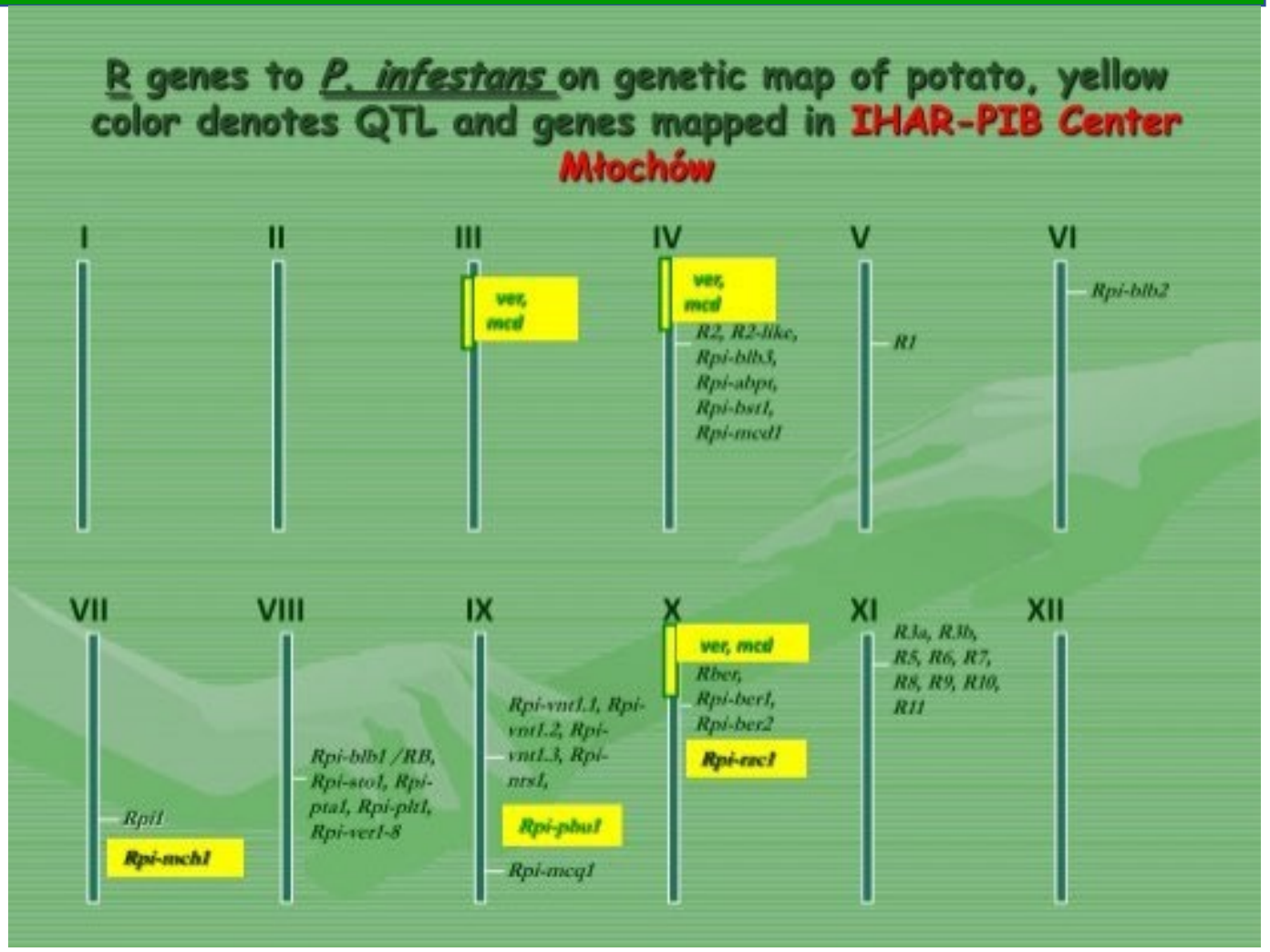
Late Blight Resistance: JKI Prebreeding



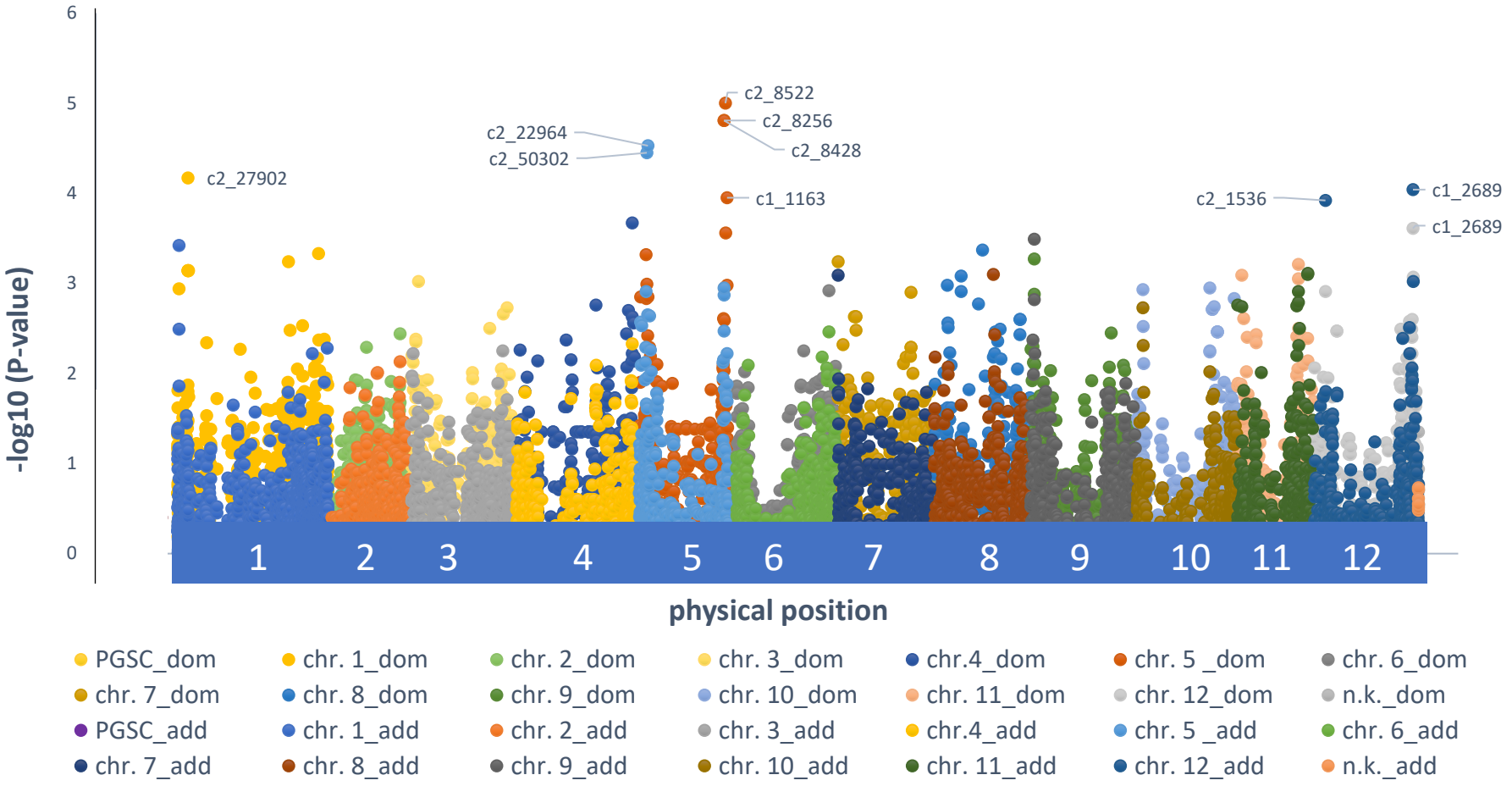
Field Trials: Assessment of late Blight Resistance:



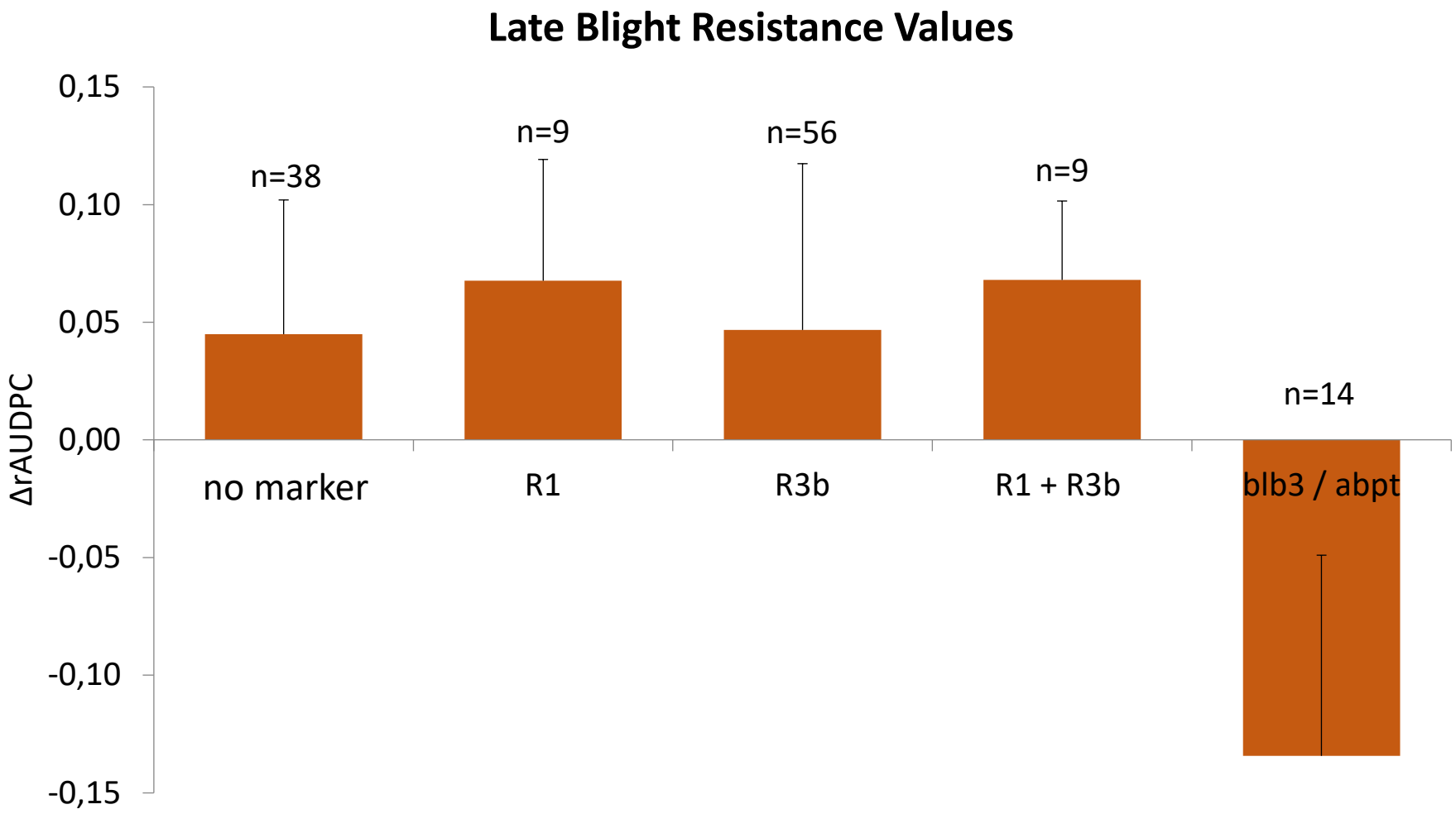
Marker Assisted Selection: *Pi* Resistance



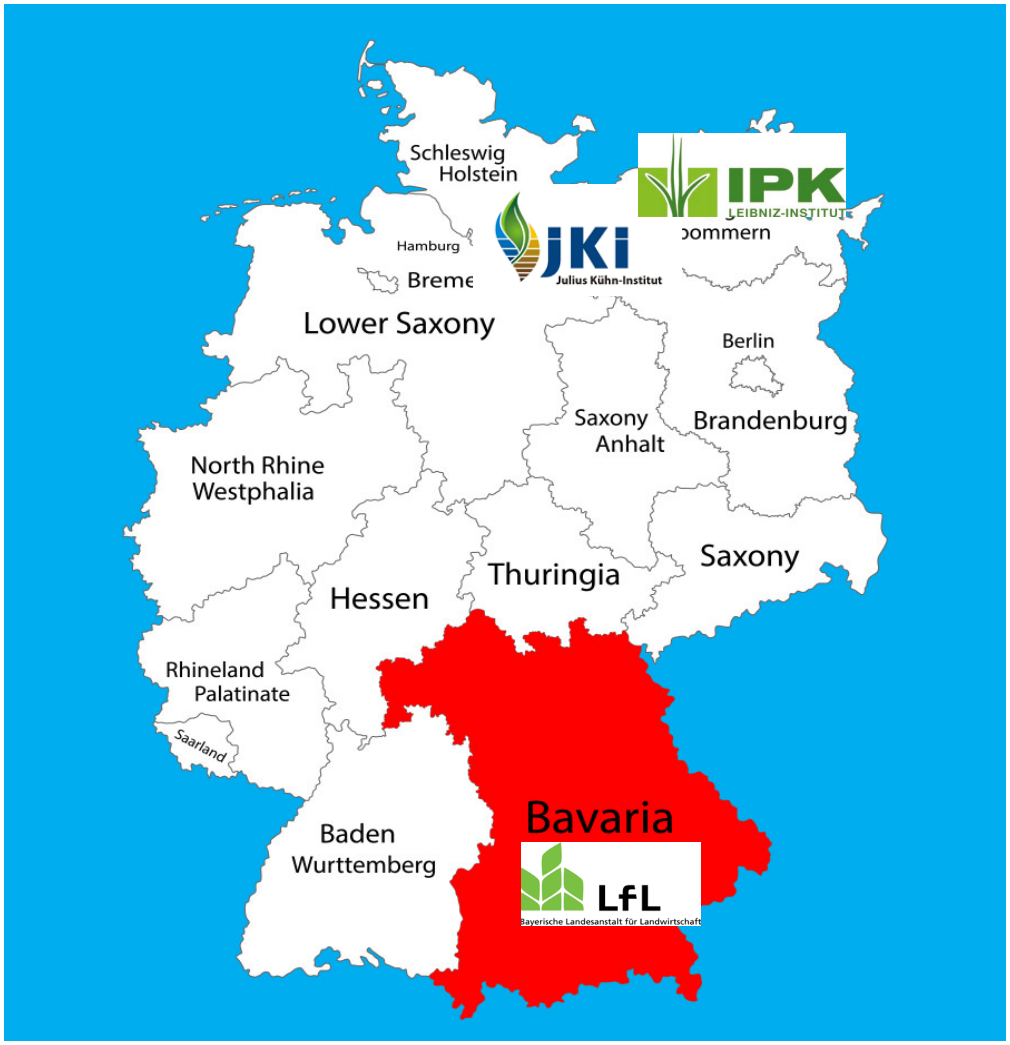
Marker Assisted Selection: *Pi* Resistance



Marker Analysis and Field Trials



Participative Breeding



On Farm Selection

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Certified Organic Fields

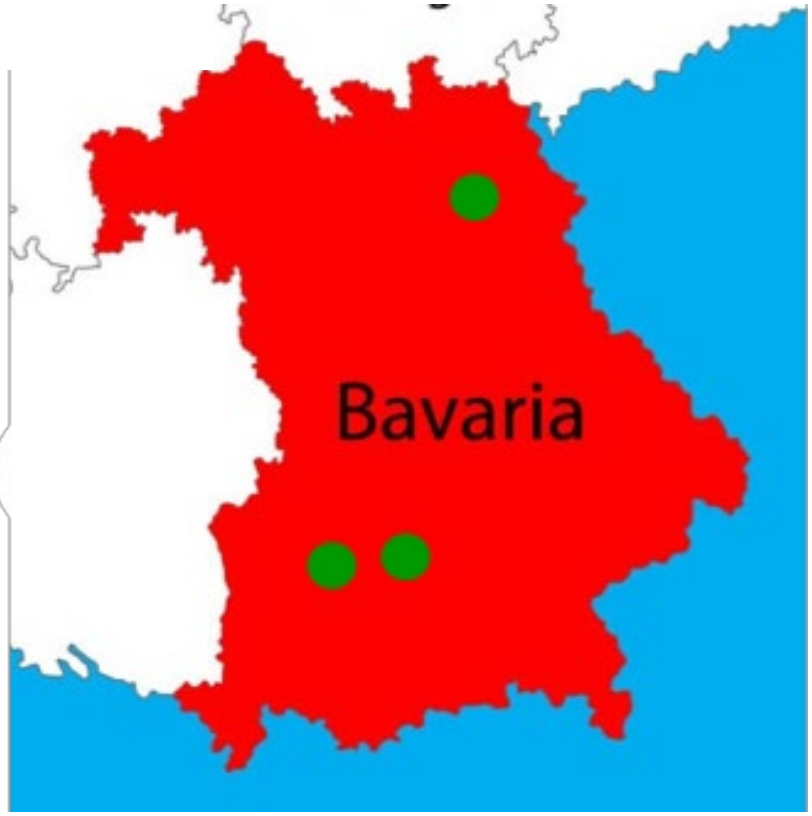
Naturland

Bioland

no fungicide

6000 – 8000

minitubers per year



Selection Criteria for **Farming**

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resilience
Flesh colour
maturity
Blaufleckigkeit
Rhizoctonia
Alternaria youth development
Stolbur
Pathogen resistance
tuber size
late blight resistance
skin colour
virus resistance
Nährstoffeffizienz
tuber shape
tuber blight resistance
yield
skin quality
drought tolerance
leaf habitus
storability
cycada

Selection Criteria for **Marketing**

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cooking type
resilience
maturity
Flesh colour
taste
Blaufleckigkeit
Rhizoctonia
youth development
food quality
Stolbur
Pathogen resistance
tuber size
late blight resistance
cooking quality
Alternaria
virus resistance
Nährstoffeffizienz
tuber shape
tuber blight resistance
skin colour
yield
skin quality
drought tolerance
leaf habitus
storability
cycada

Selection Criteria for farming

ForKa Projektbüro

resilience
cooking type
maturity
Flesh colour
Dumpling
taste
Blaufleckigkeit
Rhizoctonia
youth development
Rohbreiverfärbung
Stolbur
Pathogen resistance
tuber size
Food quality
French fries
late blight resistance
Cooking quality
texture
virus resistance
Nährstoffeffizienz
Alternaria
tuber shape
tuber blight resistance
Starch content
skin colour
yield
skin quality
drought tolerance
storability
leaf habitus
cycada
Röstitest
Crisps

Conclusions

1. late blight resistance can be maintained by on farm selection without fungicide application
2. DNA Marker prerequisite for choosing crossbreeding parents
3. Clones susceptible to *Alternaria* are lost early in the breeding process
4. On organically farmed fields we select **robust** and **resilient clones** which tolerate a range of pathogens and difficult weather conditions

Outlook and Points of Discussion

Fundamental study on the biology is the key for successful breeding.

Jack Vossen

1. research on molecular **stress response** to *Phytophthora* and *Alternaria* in potatoes (DNA, RNA and physiology)
2. more **detailed genotyping** of *Pi* isolates
3. match genotype and phenotype
   - ➢ **inoculum** for laboratory use
4. **bioactive substances** for organic farming

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Seidlhof Stiftung
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Thank you for your attention!

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