# Breeding for the future

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- Scope of plant breeding
- Major challenges
- Plant breeding progress
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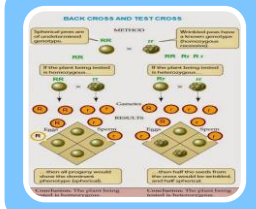
# Plant breeding – long term product development activity

**DEFINE GOALS**

**STUDY**

- TRAITS
- INHERITANCE



**PLAN**

- BREEDING PROJECT
- TARGET AREA

**ACT**

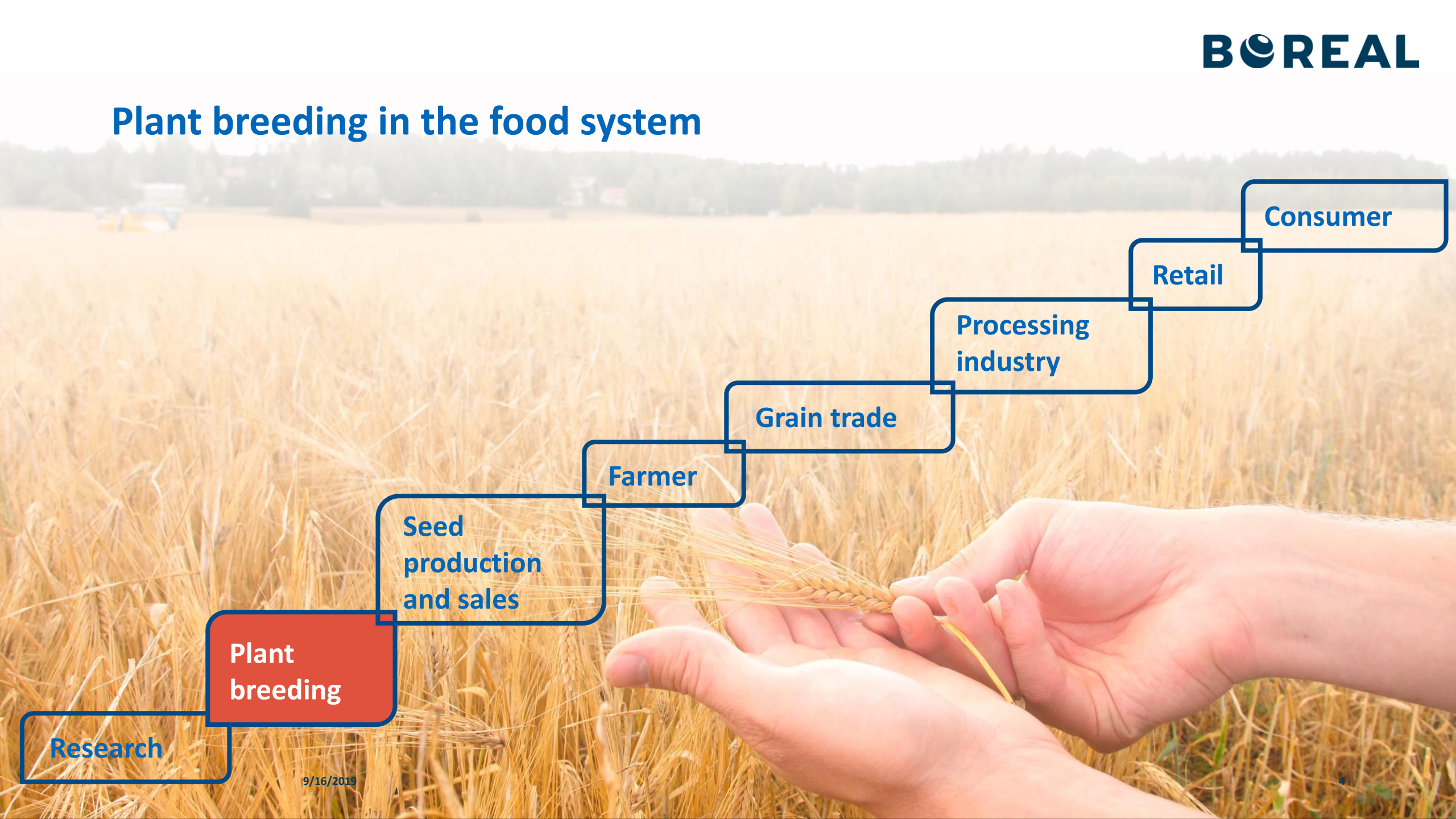
- CREATE VARIATION
- SELECT
- TEST

10-15 years

**Product: Variety**

# Plant breeding in the food system



# Future global challenges

1. Population growth and need for more and nutritive food

2. Climate change and decrease of arable land
   → Crop certainty needed
   → Higher yields needed from less land
   → Maintenance of soil fertility

3. Maintenance of clean environment
   → Improved nutrient use efficiency and resistance to pests and diseases needed

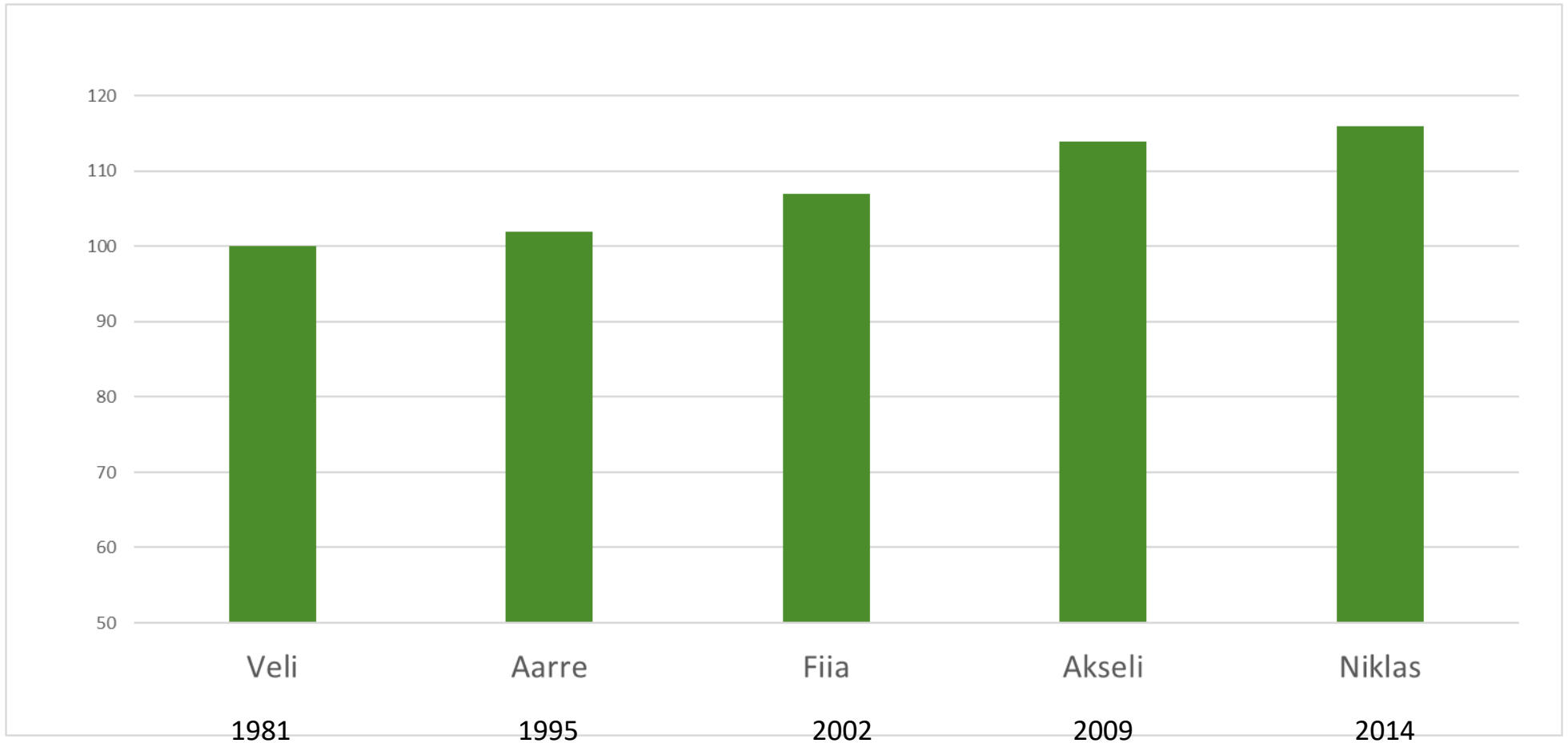
# Local climate change challenges in the North

- Seasonal changes in temperature and moisture conditions
  - Increasing precipitation late season or/and at ripening
- Weather extremes e.g. rainstorms, drought
- Variation in over-wintering  conditions
- New pests and diseases

Source: kaleva.fi **POHJOIS-SUOMI 9.6.2019 13:10**

# Plant breeding progress

# Increased yield – case early maturing Finnish oats




# Improved crop security  with better straw and stem stiffness

Spring barley “Kaarle”

Spring turnip rape:
new and old variety

# Improved winter hardiness and pest resistance

Tall fescue trial with
non-hardy and hardy genotypes

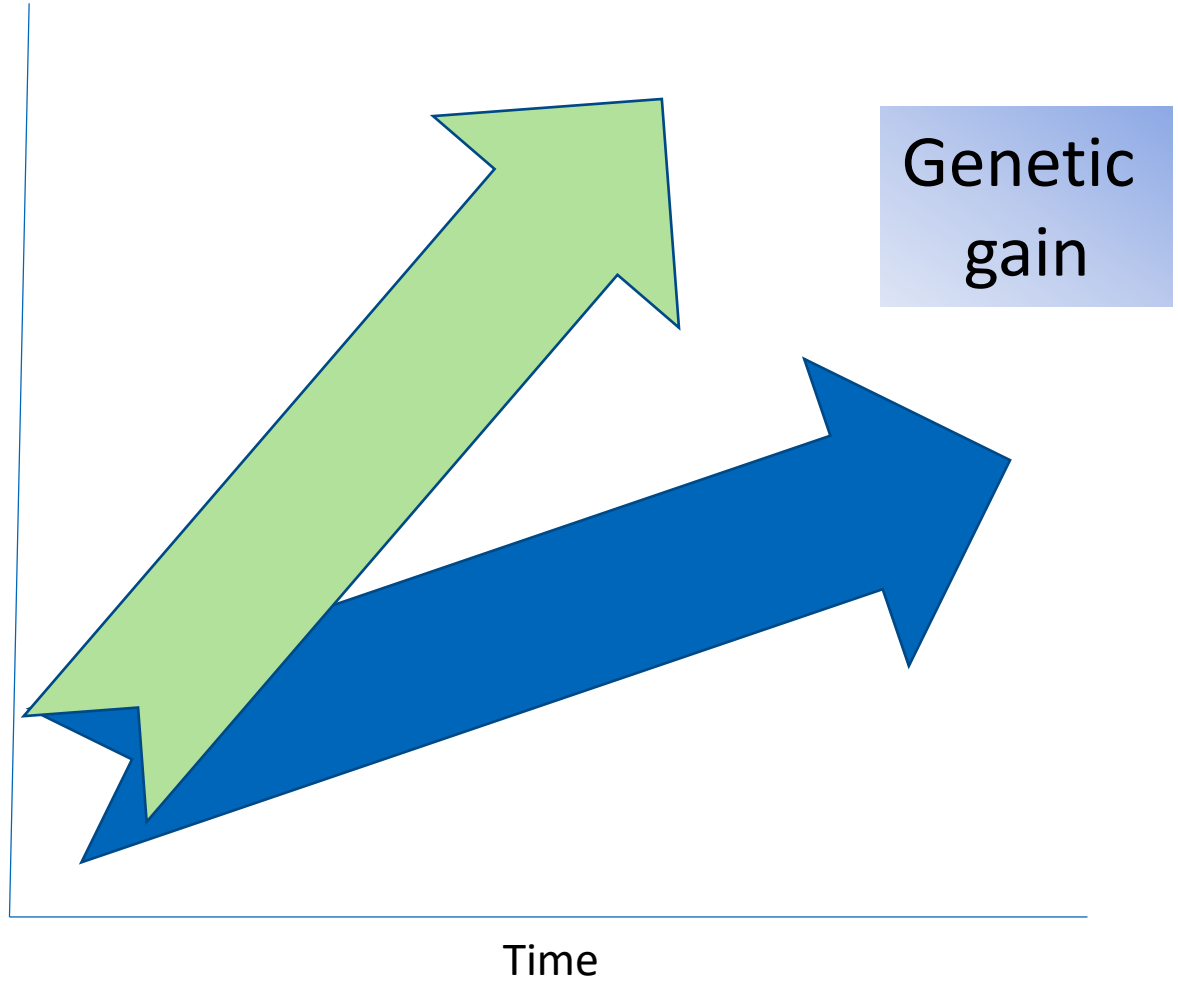
Screening winter wheat
for snow mold

# Improved end-users quality

# Future outlook

# Challenges and goals

- Crop diversity
- Sufficiency of **genetic variation** for traits needed to tackle the new challenges
- **Time and accuracy** required to select superior varieties
- Identifying testing environments for the **future climate**



# Future crops – Nordic considerations

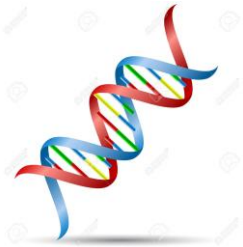
- Adaptation to local conditions, local food and feed systems
- Protein self-sufficiency
- Crop diversity: Economic and farming sustainability
- Financial resources of local plant breeding companies

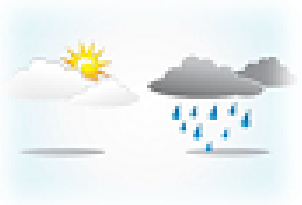
# Genetic variation is the raw material for plant breeding also in the future


… when available can be utilized through crossing

… when NOT available could be created with NBTs

# Big data and intelligent data management enable the development of varieties for future conditions





Genotype

Phenotype

Environment

Information systems

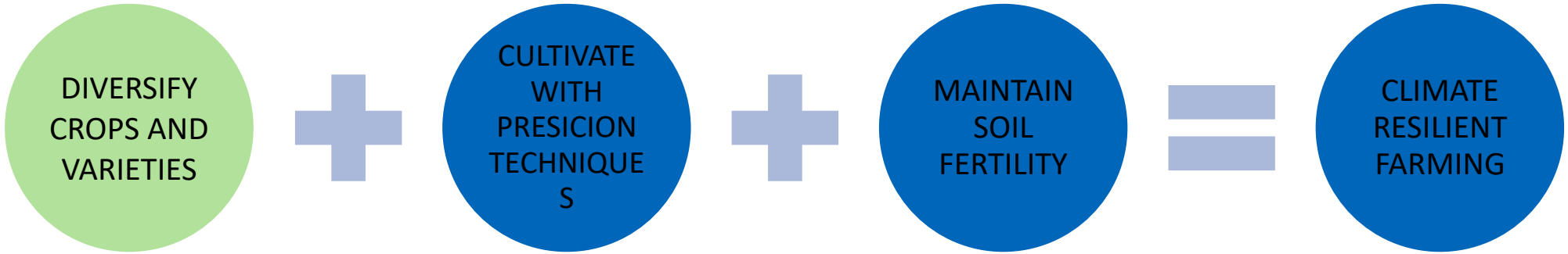
Modelling and Data Mining

Decision support tools

New climate resilient varieties

# Conclusions

- Plant breeding can provide solutions for the future food systems




- Plant breeding needs to be accelerated in order to provide solutions for the needs of a growing population in time

- Speedup requires availability, know-how and investments on new breeding technologies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