

Germany's Largest Potato Research Project: POMORROW – Potatoes for Tomorrow

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Launched in May 2025, the research project “**POMORROW – Potatoes for Tomorrow**” is dedicated to securing the future of one of the world's most important food crops: the potato. Over a period of four years, leading research institutions and potato breeding companies are working together to develop new strategies to make potato production more climate-resilient and improve the crop's performance in meeting the challenges of tomorrow.

The project aims to unlock the genetic diversity of the potato. By combining state-of-the-art biotechnological approaches, genomic analyses and innovative breeding technologies, POMORROW will lay the foundation for the efficient development of potato varieties adapted to future environmental and agricultural conditions.

A Scientific Treasure Hunt in the German Potato Genebank

More than **82,000 potato accessions** are currently conserved in genebanks around the world – representing an enormous, yet largely untapped, reservoir of genetic diversity.

“Of course, conserving plant genetic resources in genebanks is already extremely valuable for future generations. We never know which challenges we may have to face in the future,” says **Dr Vanessa Prigge** of potato breeding company SaKa Pflanzenzucht GmbH & Co. KG, overall coordinator of the POMORROW project.

“However, genetic resources only reveal their full potential as a reservoir of useful genetic diversity when they are actually used in breeding programmes. This diversity provides the foundation for developing new varieties.”

This is precisely where POMORROW comes in. The potato collection of the **German Ex Situ Genebank – Northern Subcollection in Groß Lüsewitz**, maintained by the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), will be fully genotyped. In addition, selected genetically unique accessions will be analysed using state-of-the-art sequencing technologies and incorporated into the international **potato pangenome**.

“Recent advances in sequencing technology have made this endeavour possible, as the potato has a highly complex genome,” explains **Prof. Dr Benjamin Stich** of the Julius Kühn Institute, scientific coordinator of the project.

Based on these data, POMORROW will establish a **core collection of 600 genetically diverse potato types**. Of these, 300 will undergo comprehensive phenotyping, including assessments of **drought tolerance, nutrient-use efficiency,**

resistance to plant diseases and pests – such as late blight, virus infections and leafhoppers – as well as nutritional characteristics of the tubers, including protein content, which may become increasingly important for future food systems.

Using **association genetics**, the research team will then identify genetic factors associated with desirable traits in potato plants. These can subsequently be exploited by the breeding companies through crossing and selection to develop new potato varieties.

“We particularly hope to make a breakthrough in addressing emerging or re-emerging threats in Germany, such as infestations by the reed leafhopper and potato leafroll virus,” says Vanessa Prigge. “There are currently no resistant potato varieties against these threats, and the wild relatives of the potato could provide a valuable source of resistance.”

New Approaches to Potato Breeding

One of the project’s key areas of innovation is the application of **CRISPR-based genome editing**. This technology will be used to introduce specific new traits directly into elite potato varieties that are otherwise difficult to improve, avoiding lengthy and laborious backcrossing programmes.

This approach will be complemented by **genomic prediction models**. These models will enable breeders, for the first time, to efficiently incorporate genetic information from plant genetic resources into the development of new potato varieties – including genetic effects that individually have only small contributions to a trait.

“With POMORROW, we are systematically unlocking the genetic diversity of the potato and combining it with state-of-the-art breeding technologies. This will create the foundation for robust, healthy and high-yielding varieties capable of meeting the future demands of agriculture, food production and a changing climate.”

— Prof. Dr Benjamin Stich, Scientific Coordinator of POMORROW, Julius Kühn Institute

A Strong Alliance of Science and Industry

Funded by the **Federal Ministry of Research, Technology and Space (BMFTR)**, POMORROW brings together cutting-edge research with practical expertise in potato breeding.

With a total funding volume of approximately **€4.7 million**, the project is supported through the BMFTR funding programme “**Modern Breeding Research for Climate- and Site-Adapted Crops of Tomorrow**.” The project is administered by **Project Management Jülich (PtJ)**.

The project will run for **four years, from May 2025 to May 2029**.

Folgende Institutionen sind beteiligt:

Scientific Partners:

- Julius-Kühn-Institut (JKI)
- Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung (IPK)
- Institut für Biologie und Biotechnologie der Pflanzen, Universität Münster (IBBP)
- Max-Planck-Institut für Molekulare Pflanzenphysiologie (MPIMP)
- Institut für Pflanzenschutz, Hochschule Geisenheim University (HGU)

Breeding Partners:

- SaKa Pflanzenzucht GmbH & Co. KG
- Europlant Innovation GmbH & Co. KG
- Norika GmbH
- Gemeinschaft zur Förderung von Pflanzeninnovation e. V. (GFPI)

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The potato accessions conserved in the German Genebank, shown here being propagated in the greenhouse at IPK in Groß Lüsewitz, are impressive in their diversity. In the best-case scenario, POMORROW will identify the key genetic variants they hold to help develop future potato varieties that are even more climate-resilient and high-performing. (Photo: GFPI)



So small, yet so destructive: to date, no potato varieties are known to be resistant to the leafhopper or to the pathogens it transmits, leading to severe yield losses in southern Germany and across southern Europe. The POMORROW project partners are therefore searching genetic resources for suitable resistance donors to support the development of resistant potato varieties. (Photo: Uni Geisenheim)