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The challenges in breeding multipurpose crops

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EU Green Week Partner Event





What have we achieved through breeding?





Breeding has increased productivity massively



1. Hectare: A hectare is a unit of area used to measure land surface. It corresponds to 10,000 square meters, or a square piece of land that's 100 meters on each side. Hectares are commonly used in agriculture because they represent a practical size for large plots of land. For comparison, a hectare is roughly the size of two American football fields.

Although cereal crops were domesticated 5,000-10,000 years ago, they barely improved over several millennia of human agriculture



Breeding enables us to produce more with less land





Source: Our World in Data based on World Bank; Food and Agriculture Organization of the United Nations OurWorldInData.org/crop-yields • CC BY

In the past two decades, **plant breeding alone** has contributed to **~67% increase of crop productivity** in the EU*, ensuring a stable

supply of food, feed and biomass for the EU and beyond, while reducing the need for agricultural land

*Noleppa and Cartsburg (2021)



Breeding has increased productivity massively



Breeding is a long and resource-intensive process

For plant species that we regularly grow and eat, typical duration from an initial cross to a new registered variety

Graden When Potato Apple Rabes Bean 8-10 14 - 15 20 - 25 +years years years

Breeding and commercialising a new wheat variety costs ~€15 M

Breeding is a constant effort, new varieties become "old" within 2-5 years



Case examples: The development of a new sugar beet variety takes up to 10 years



Variety development in time with major steps **SES**VANDFRHAVF sugar beet seed Hand Year 1 cross Line **Year 2-3 Breeder's equation** development **Outdoor test** Year 4 **Precision of Intensity of** seed production Selection **Selection Year 5-6 Field trials** Outdoor OVT seed Year 7 Genetic production Genetic ir A Variability Gain R_t OVT **Year 8-9** y **Year 10** Time **New variety**

OVT = Official Variety Trial

The green transition requires more and faster varietal solutions than ever

For the breeding companies this is a significant challenge, but an opportunity at the same time

Societal expectations & policy change

CHALLENGES FOR VARIETY DEVELOPMENT

- 1. More **complex** trait profile
- 2. Adaptation of varieties to **agricultural practices** of the future
- 3. Even **faster development** of varietal solutions

The EU Green Deal Striving to be the first climate-neutral continent





Climate change

Increase of

global food production

In the past, plant breeders had to handle less complex information



Major sources of information plant breeders used to advance their breeding programmes



Plant breeding has become increasingly complex due to more rapid generation of scientific knowledge

A diverse set of expertise is required to be successful

Image Analyst
Image Analyst<

Modern Project Managers

Team players with people management skills



sugar beet seed



Breeding new plant varieties for diverse production systems, requires





Plants for the Future European Technology Platform





Check out our Plantastic Discoveries for bite-sized insights on plant breeding!