



## Need for Organic Plant Breeding to secure integrity of organic food

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How organic breeding adds value to the food chain

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#BreedingABrightFuture

# Great Challenges for Sustainable food production

## European Farm to Fork Strategy

- **Reduce environmental and climate footprint** of food system
- Strengthen resilience and food security in **face of climate change and biodiversity loss**
- Access to **sufficient, nutritious, sustainable and affordable food**
- Facilitation of global transition of food systems
- Circular bio-based economy, **reduction of nutrient losses by 50%**
- Reduced pesticides and **antibiotics by 50%**
- Increase **organic farming to 25%** of total farmland by 2030



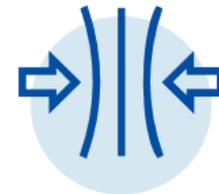
climate  
footprint



global  
transition



new  
opportunities

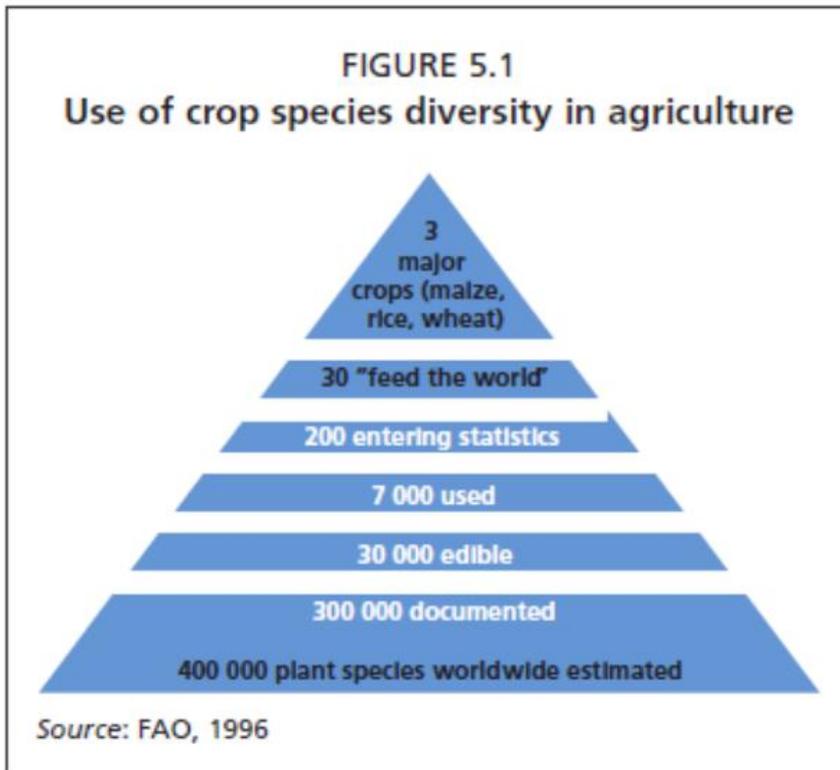


resilience

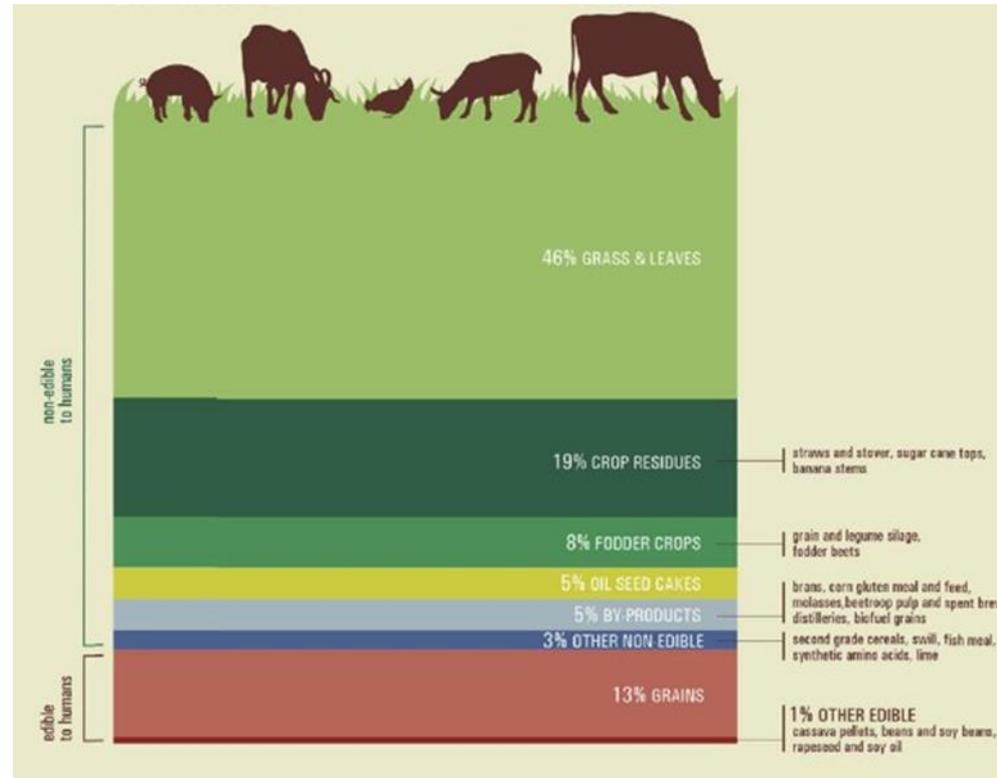
# Great Challenges for Sustainable food production

- Strong market concentration with global players in seed and livestock breeding
- Shrinking agricultural land and declining soil fertility
- Transition of diets towards more plant based proteins instead of meat
- Quality requirements of raw material for organic food processing
- Demand of organic consumers for healthy and tasty food from local production **free from genetic engineering**

# Loss of Agrobiodiversity



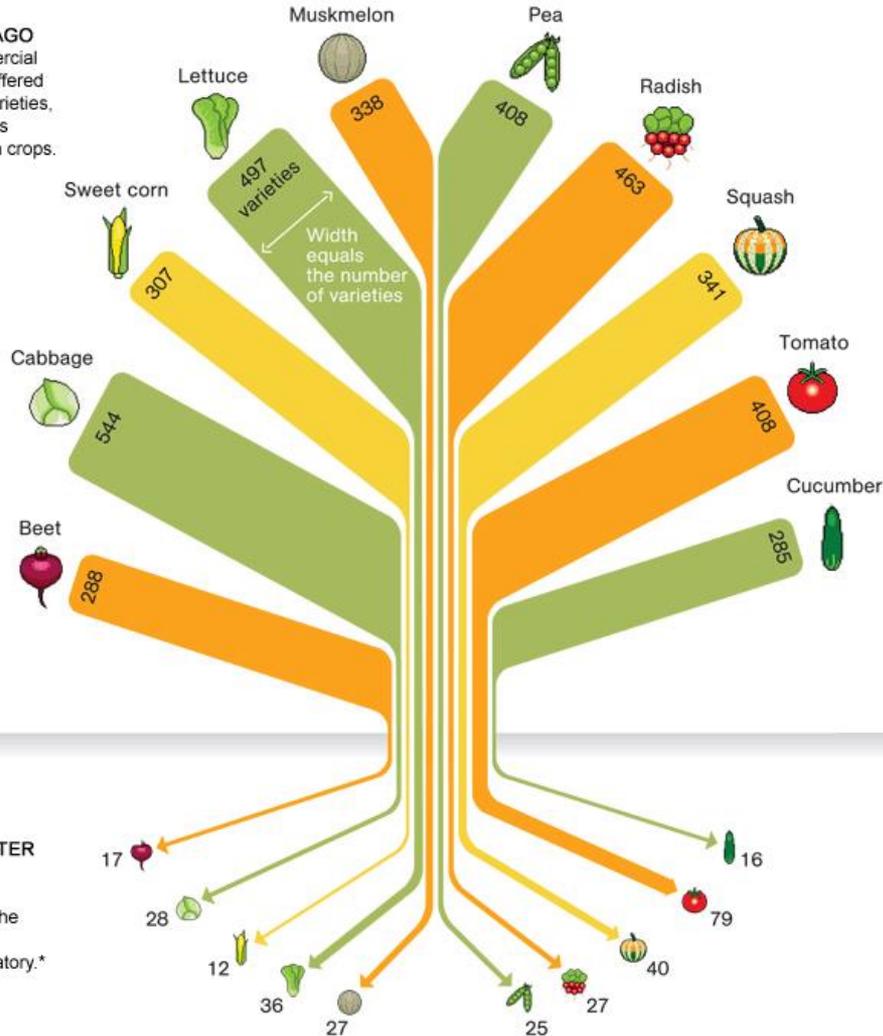
More than 40% of human calories are based on three crops and 5 livestock species



Adesogan, et al. 2020 Animal source of foods. *Global Food security* 25,  
<https://www.sciencedirect.com/science/article/pii/S2211912419300525?via%3Dihub>

# Loss of genetic diversity within crops

**A CENTURY AGO**  
In 1903 commercial seed houses offered hundreds of varieties, as shown in this sampling of ten crops.



1903

1983

**80 YEARS LATER**  
By 1983 few of those varieties were found in the National Seed Storage Laboratory.\*

\* CHANGED ITS NAME IN 2001 TO THE NATIONAL CENTER FOR GENETIC RESOURCES PRESERVATION

JOHN TOMANIO, NGM STAFF. FOOD ICONS: QUICKHONEY  
SOURCE: RURAL ADVANCEMENT FOUNDATION INTERNATIONAL

# Demands of Organic Sector on Crop Cultivars

Cultivars of large **number of crops** adapted to organic farms, which deliver sufficiently high and above all **stable yields of high quality even** under low-input conditions and build up soil fertility.

Specific variety requirements:

- Rapid youth development
- Nutrient efficiency and high N-fixation
- Weed suppression capacity or weed tolerance
- Resistance pest and diseases
- Good digestibility and nutritional value of forage plants
- Good processability, nutritional quality and taste
- Long shelf life

Option for Farm saved seed

Genetic diversity (within cultivar, mixed cropping, cultivar mixtures)

Prohibition of GMOs (including cytoplasm fusion, gene editing)

Conservation and free access to GMO-free genetic resources

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# Current situation in plant breeding

## The integrity of the organic sector is at stake

Large conventional breeders concentrate on a few large crops with a focus on high input conventional agriculture. These varieties account for around 90% of organic farming

- neglect of niche crops important for organic farming such as legumes, catch crops and special crops
- Limited suitability of high-input varieties in organic farming

More and more methods used in conventional breeding do not comply with the IFOAM guidelines for organic farming.

- Cell fusion-derived CMS hybrids dominate the market for Brassica vegetables and chicory, but are no longer permitted in most organic labels leading to massive variety bottlenecks for cauliflower and broccoli.
- Farmer stopp cultivation of these crops

*Organic breeding relies on varieties that are cell fusion-free, reproducible, robust, yield stable, locally adapted and tasteful.*

# Demands of Organic Sector on Animal Breeds

Breeds adapted to organic farms, with a high lifetime output, high fertility and health, taking into account animal welfare aspects and maintaining genetic diversity for high-quality food

Specific requirements:

- Robust animals with long life and good health (no antibiotics)
- Local breed of local breeds appropriate to the location
- Animals that can cope with the farm's own feed
- Healthy offspring
- Preservation of breed typical characteristics (e.g. horns)
- Good nutritional quality and taste

Conservation of genetic diversity

Ban on GMOs (incl. NBT)

Conservation and free access to GMO-free genetic resources

# Current situation in animal breeding

The integrity of the organic sector is at stake

Conventional animal breeding focuses on a few high-performance animal breeds

Loss of animal breeds adapted to organic farming

Many cows come from artificial insemination of bulls derived from embryo transfer

Drastic narrowing of the genetic material - also for further breeding

Extremely high dependence on conventional breeding

→ Most high-performance breeds are unsuitable for organic farming

*Organic breeding focuses on high basic feed performance for cows, dual-purpose breeds for chickens and robust pig breeds*

# Why do we need an independent organic breeding

- **Strong restriction of the genetic diversity** of cultivated species and animal breeds, patenting of living organisms and increasing dependence on a few multi-national breeding companies
- Conventional breeding with a **focus on industrialised agriculture is** diverging more and more from the demands of organic producers for sustainable production and animal welfare
- **Use of new breeding technologies** (e.g. cell fusion, gene editing, cis genetics) contradict the principles of IFOAM International
- **Continuous adaptation of cultivars** to changing conditions (e.g. climate change, new harmful organisms, customer requirements, legal framework)
- Growing **organic market with high demands on** quality and integrity of production, fair trade, regional production, sustainable animal feed, closed nutrient and energy cycles, no environmental pollution, diverse and nutritious food, vegetarian and allergy free products

# Why Organic Plant Breeding must be strongly promoted?

- Today there is **high dependency on cultivars bred for high input conditions** by multi-national companies (> 90%)
- Until now only **few organic breeding initiatives** covering a small number of crops driven by pioneers investing own resources
- Breeding is long term approach **needs 10 to 20 years** before first cultivars can be released, thus it needs long term engagement
- Special demand of organic sector needs **higher and more diverse breeding efforts** using breeding methods that comply with IFOAM principles
- **Capacity building** and career development of young breeders is urgently needed
- **Divergence in breeding goals and techniques** will cause severe shortage of cultivars and contamination problems in near future



→ loss of consumer trust



# How does the organic sector benefits from organic breeding?

- Organic breeding respects the values and principles of the organic sector and does not use critical breeding methods → ensures the integrity of organic products and strengthens consumer confidence
- Organic breeding takes into account the needs of organic farmers, processors, traders and customers → foundation for the high quality of organic food
- Organic breeding produces animals taking animal welfare, sustainable feeding and husbandry into account and creates a broad range of adapted plant cultivars → innovative sustainable and climate friendly food systems promoting circular economy
- Organic breeding is the basis for a self-determined, independent further development of the organic sector → Organic breeding is important R&D activity to secure supply for sustainable organic food in the future

Normal people just see a seed:



Gardeners see the dreams within:



Joseph Tychonievich

# Thank you very much for your attention.

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