

Pathfinder Info Day 2025

Bruxelles, 4<sup>th</sup> April 2025

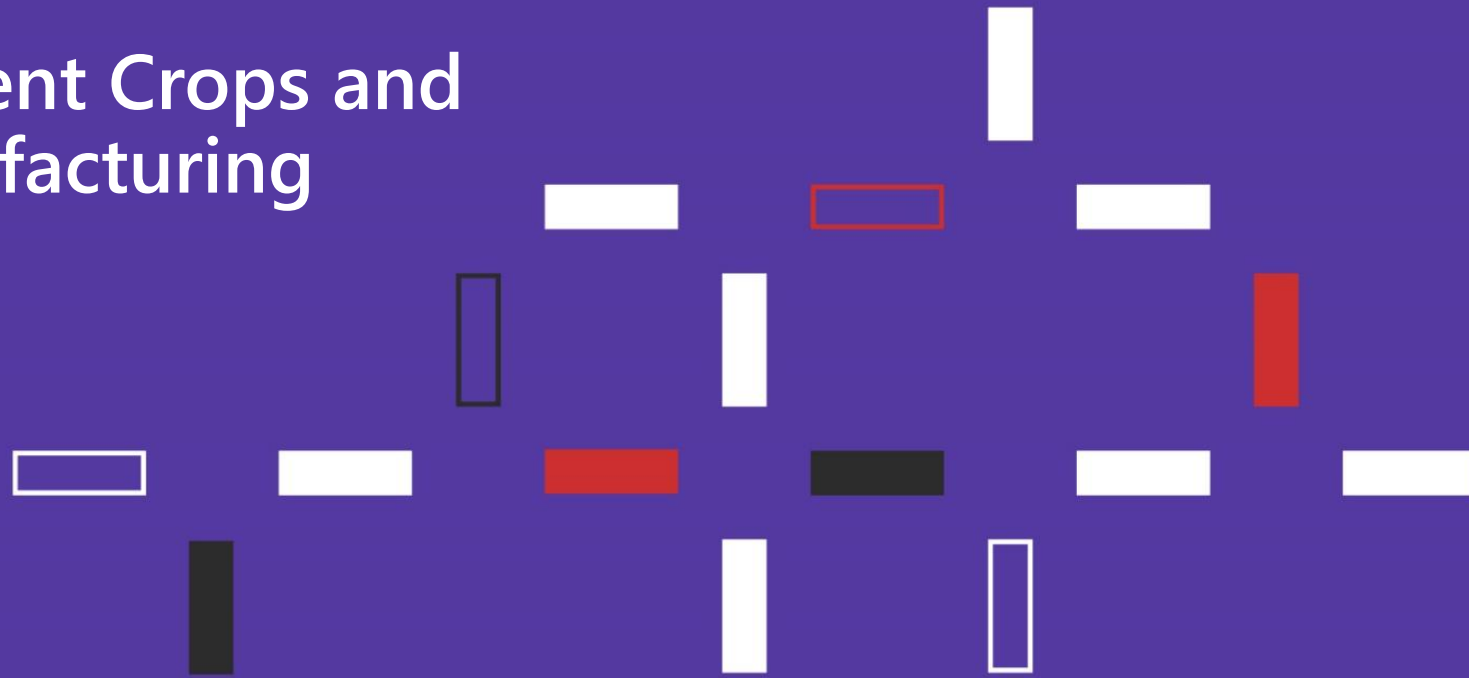
European  
Innovation  
Council



# Backing visionary entrepreneurs

## Biotech for Climate Resilient Crops and Plant-based Biomanufacturing

Ivan Stefanic Programme Manager for  
Food Chain Technologies and  
Novel and Sustainable Food





Join us at

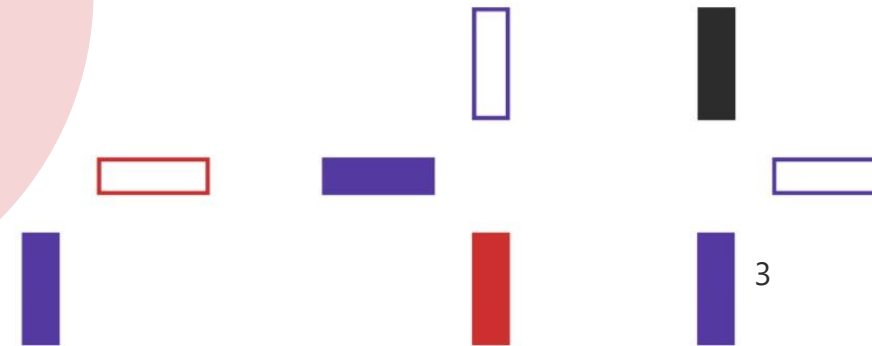
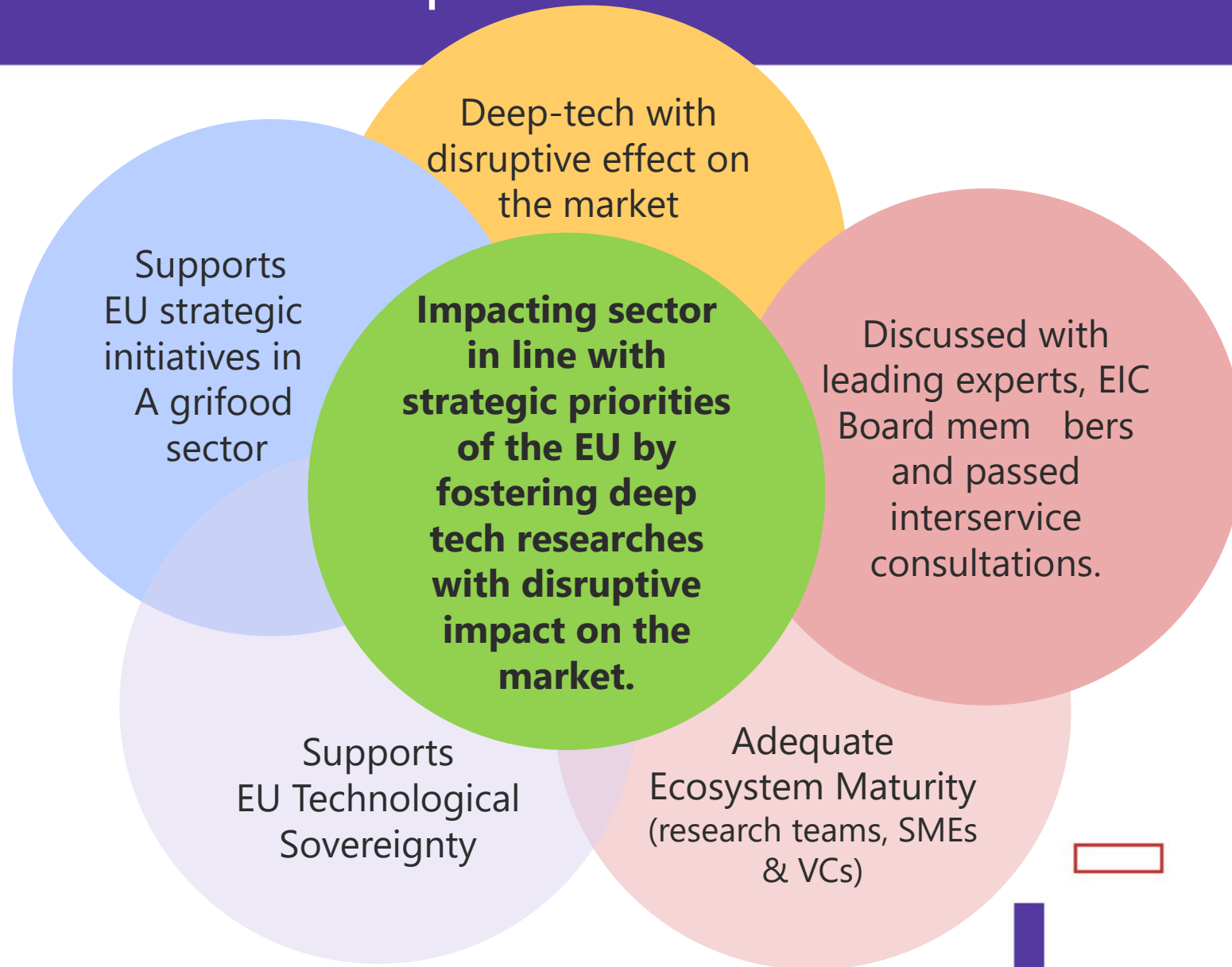
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**#PathfinderChallenges**



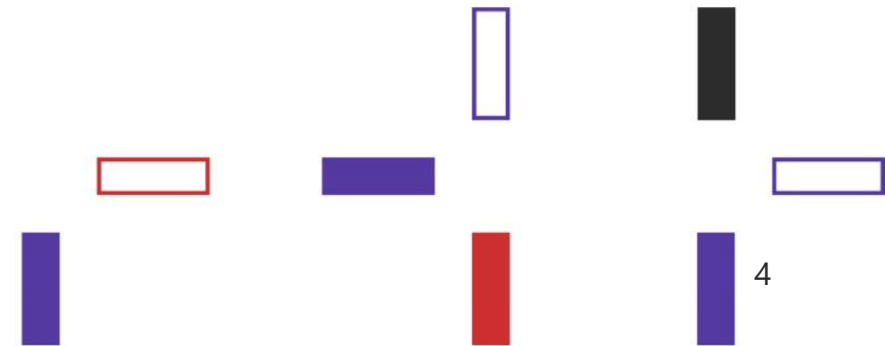
# EIC Pathfinder challenge 2025

## Biotech for Climate Resilient Crops and Plant-based Biomanufacturing





- *Title of the Challenge:*
- **Biotech for Climate Resilient Crops and Plant-based Biomanufacturing**
- *What is the specific problem to be addressed through this Challenge?*
- **Proposed challenge represent a novel solution to produce proteins and other high-value ingredients under unfavourable environmental conditions.**

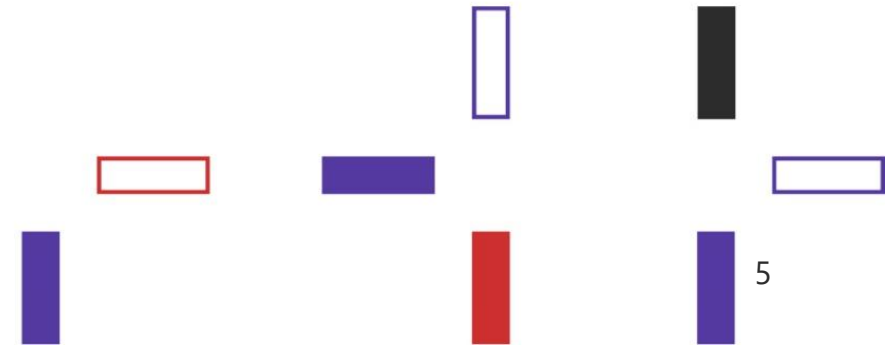


# Why this challenge?



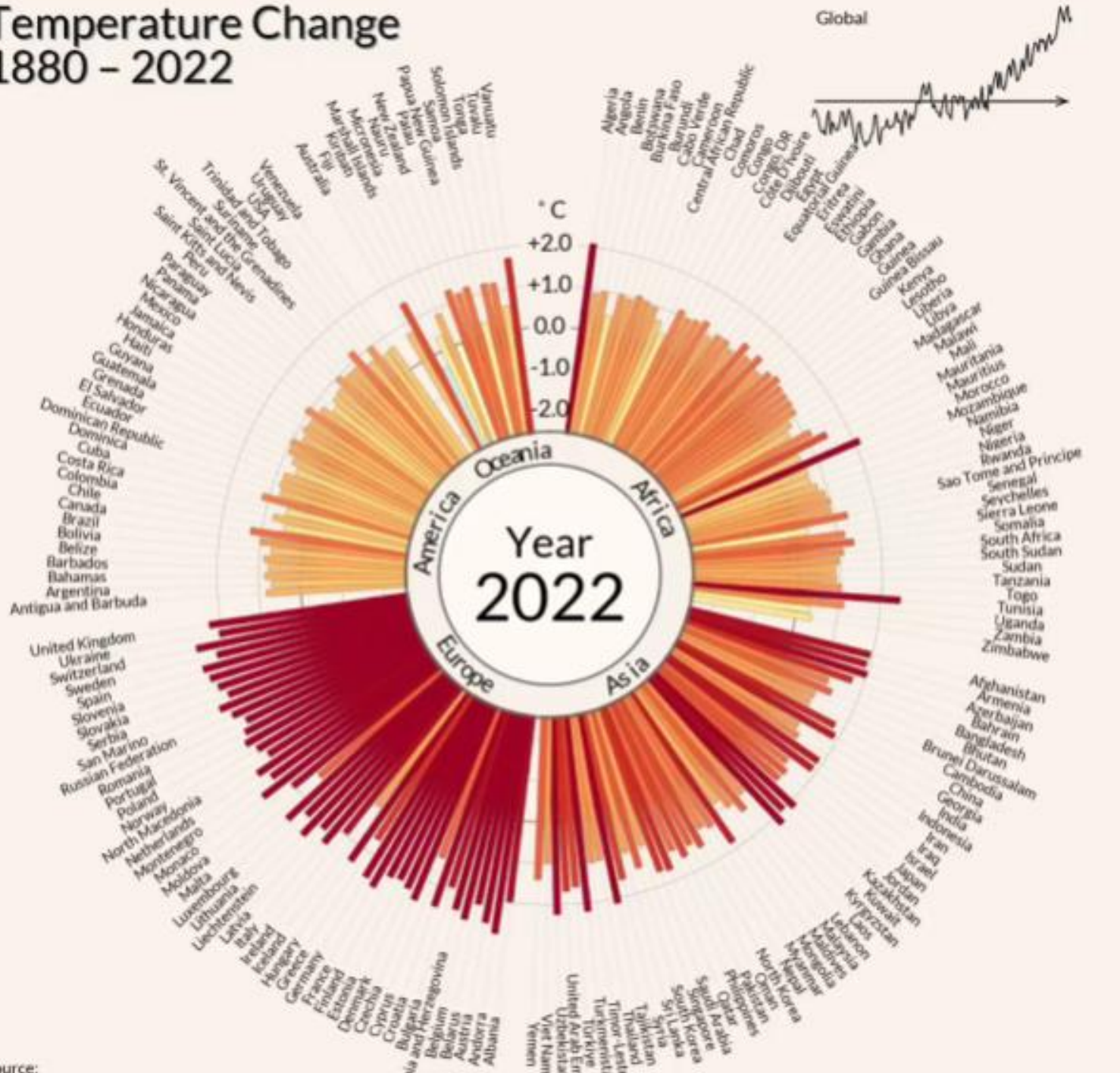
## Food Chain Technologies & Novel and Sustainable Food

- state of the art -





# Temperature Change 1880 - 2022



Plants most likely don't know or care about humans, their economy, and the rootcause of global warming.

They simply have to adapt.

## Temperature Circle 1880-2022

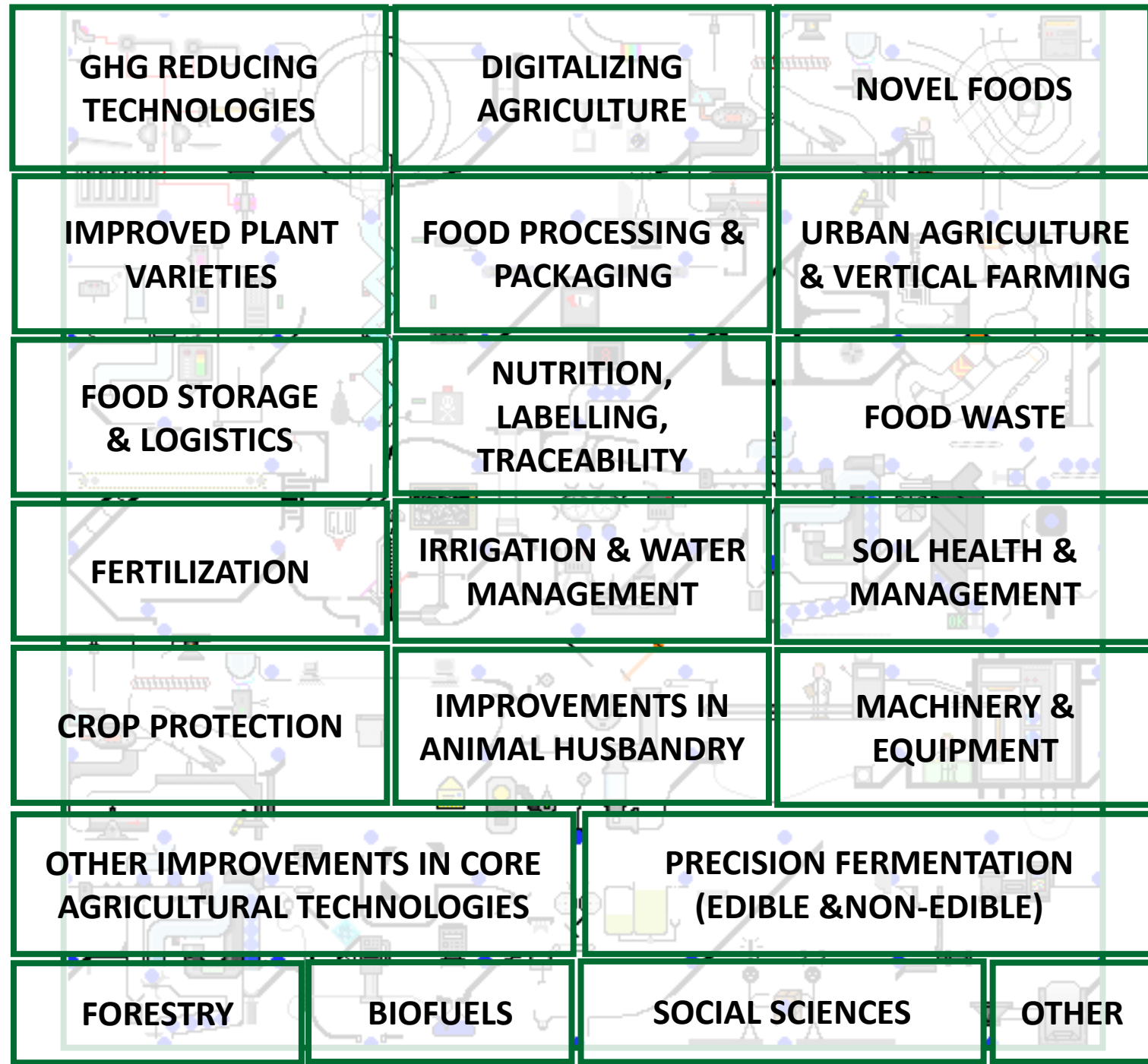
Temperature Circle 1880-2022. Temperature change by country.

Base period 1951-1980.

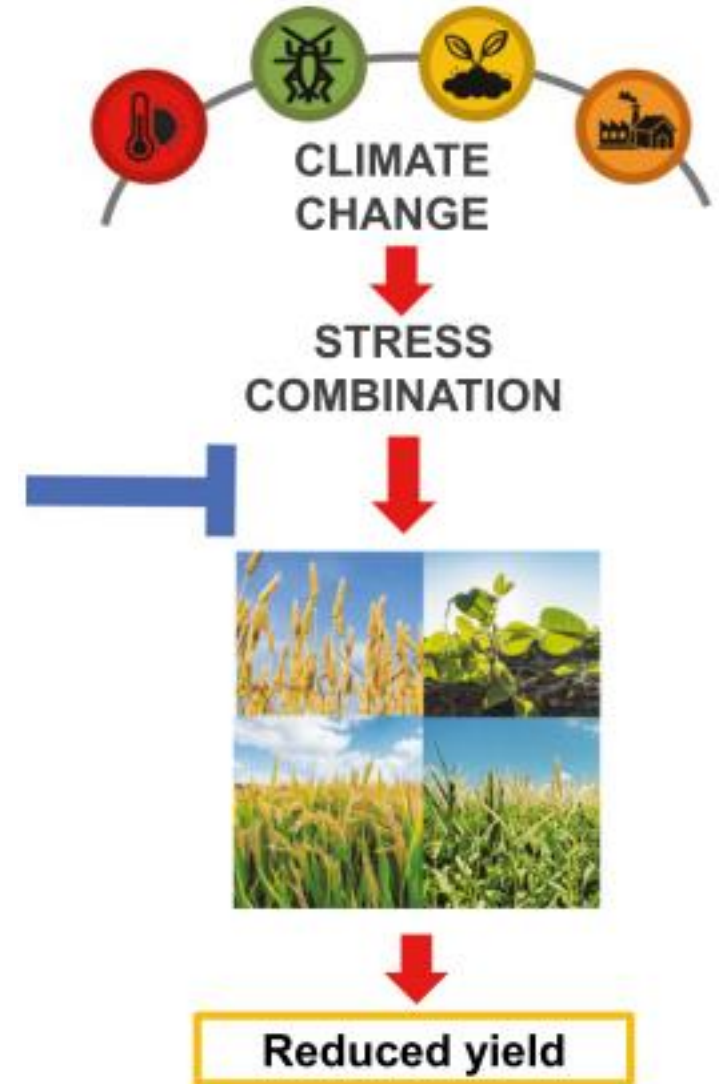
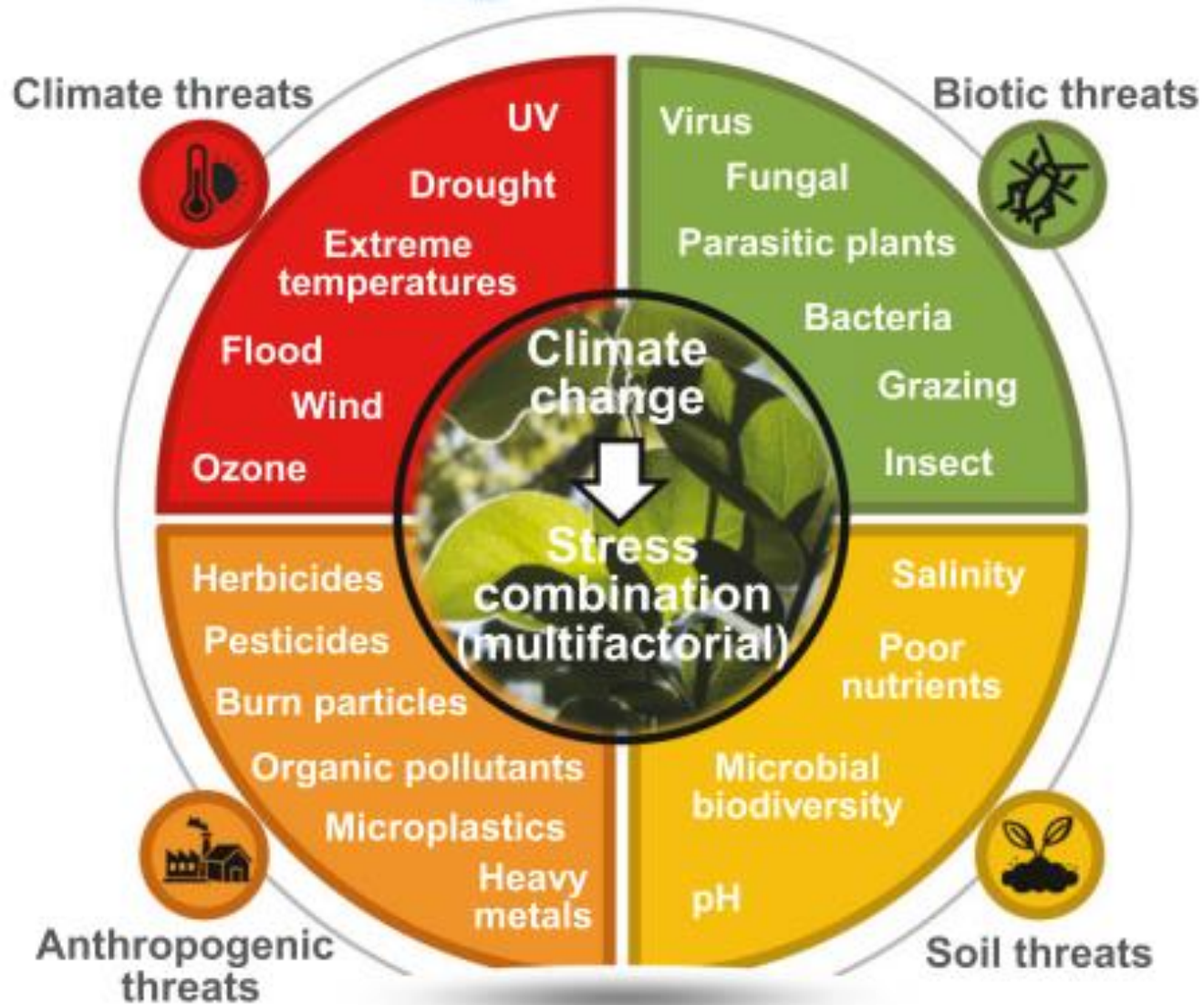
By Antti Lipponen - Based on NASA GISS GISTEMP data.

# Complexity in:

- Food Chain Technologies and
- Novel & Sustainable Food



# Background – Stress Factors in Modern Agriculture



# Background – How it works



Zhou et al.

Crop Tolerance to Abiotic Stresses

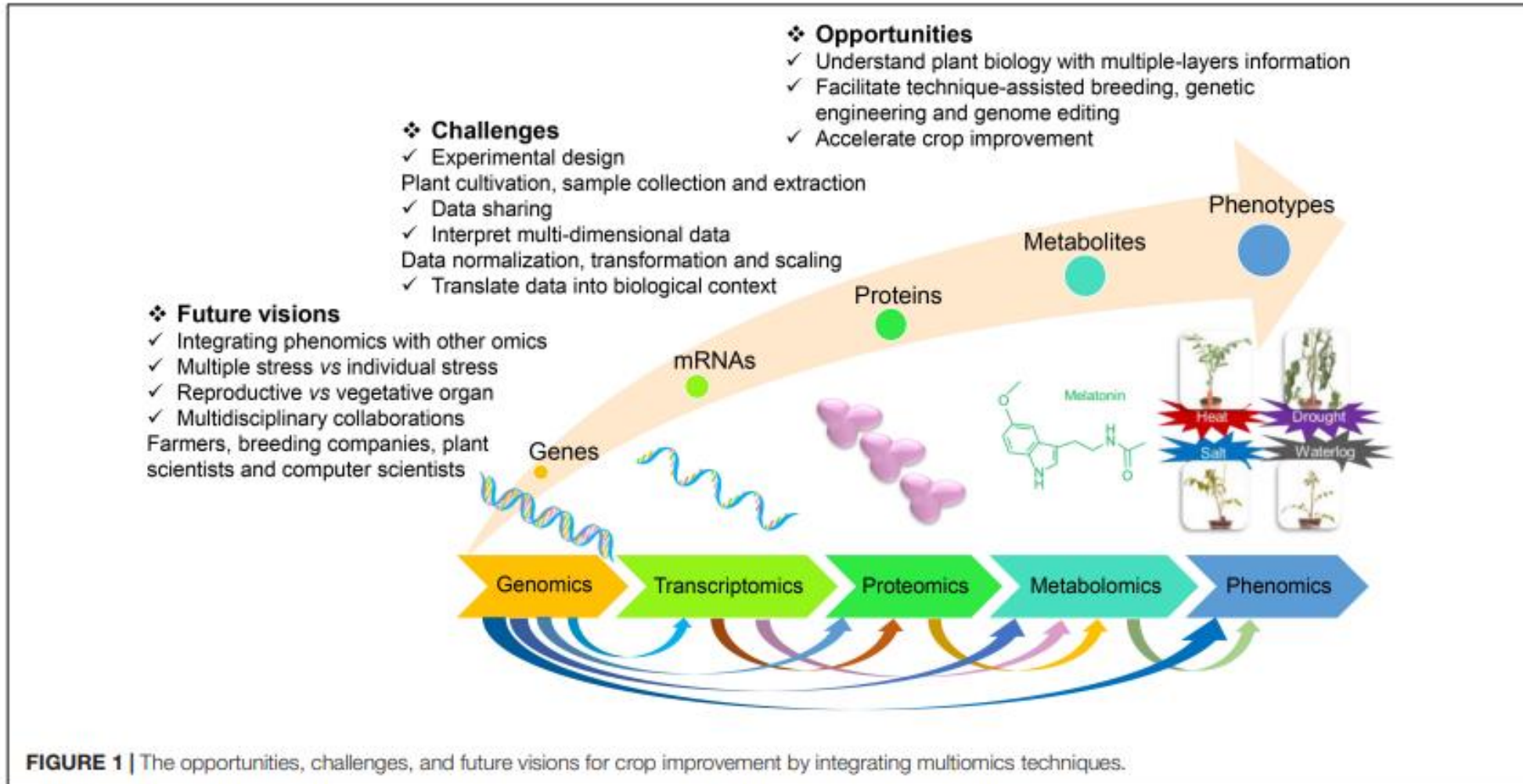


FIGURE 1 | The opportunities, challenges, and future visions for crop improvement by integrating multiomics techniques.



# Background – Case: Production of ovoalbumin



Ovoalbumin production  
through Free range organic  
production

**State-of-the-art 2023**

### Concerns

GHG emissions  
Antibiotics, hormones  
Ethical considerations



Ovoalbumin production  
through Precision  
fermentation

**EIC Accelerator 2024**

### Concerns

Expensive industrial  
equipment.



Ovoalbumin production  
through Plant-based  
biomanufacturing

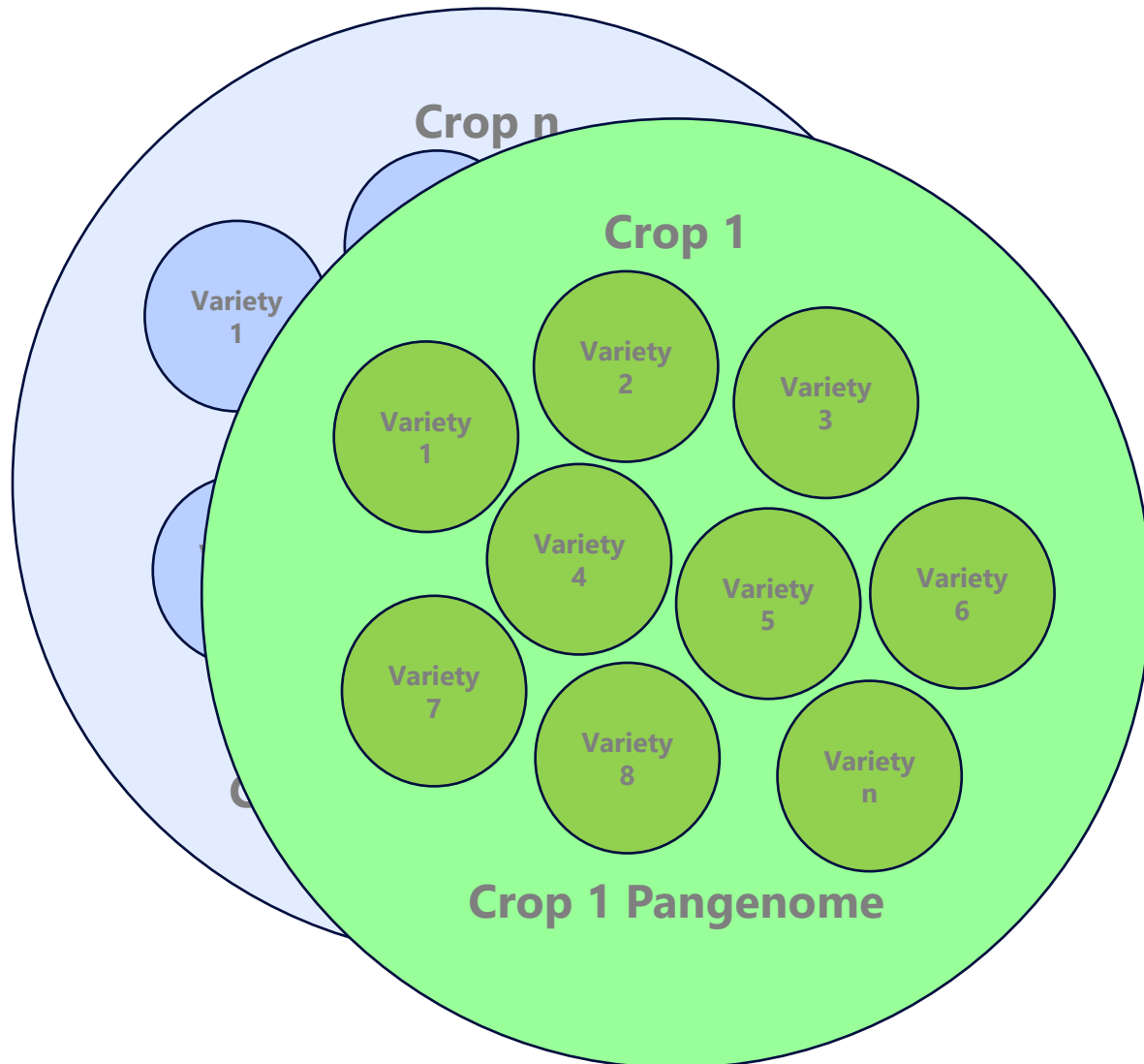
**EIC Pathfinder 2025**

### Concerns

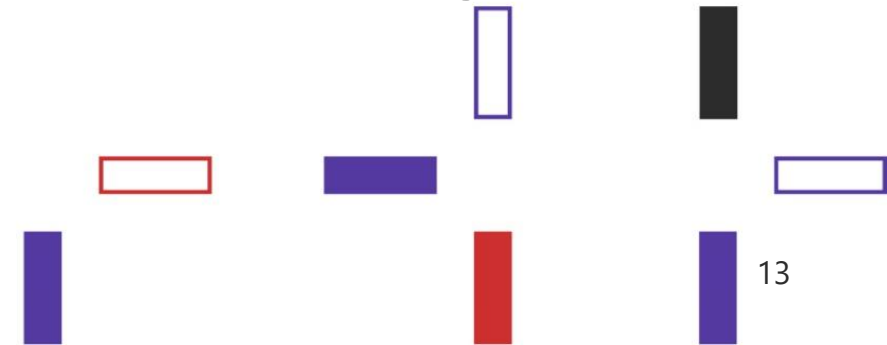
Possible health-related  
long-term effects



# Background – How it works



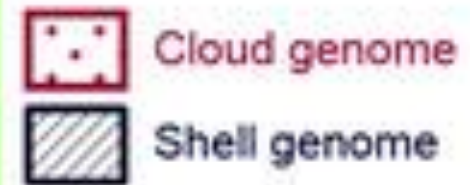
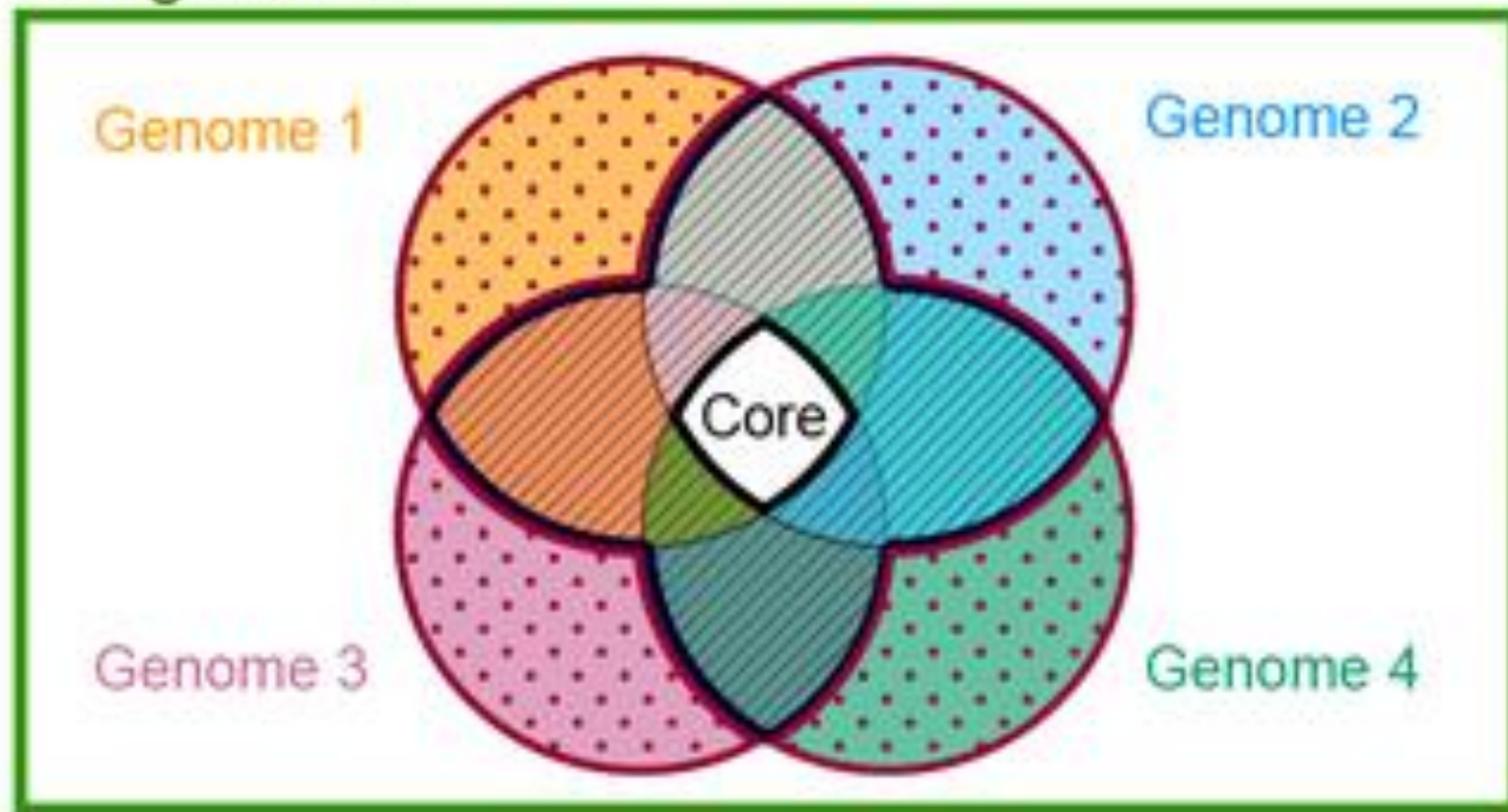
- Crop 'pangenome' captures the complete genetic diversity across multiple crop varieties to identify genetic traits that can help improve its resilience and nutritional quality.
- Conventional plant breeding techniques and NGT are deployed to modify crops to improve its resilience and produce high value native and non-native ingredients.



# Background – How it works



## Pangenome

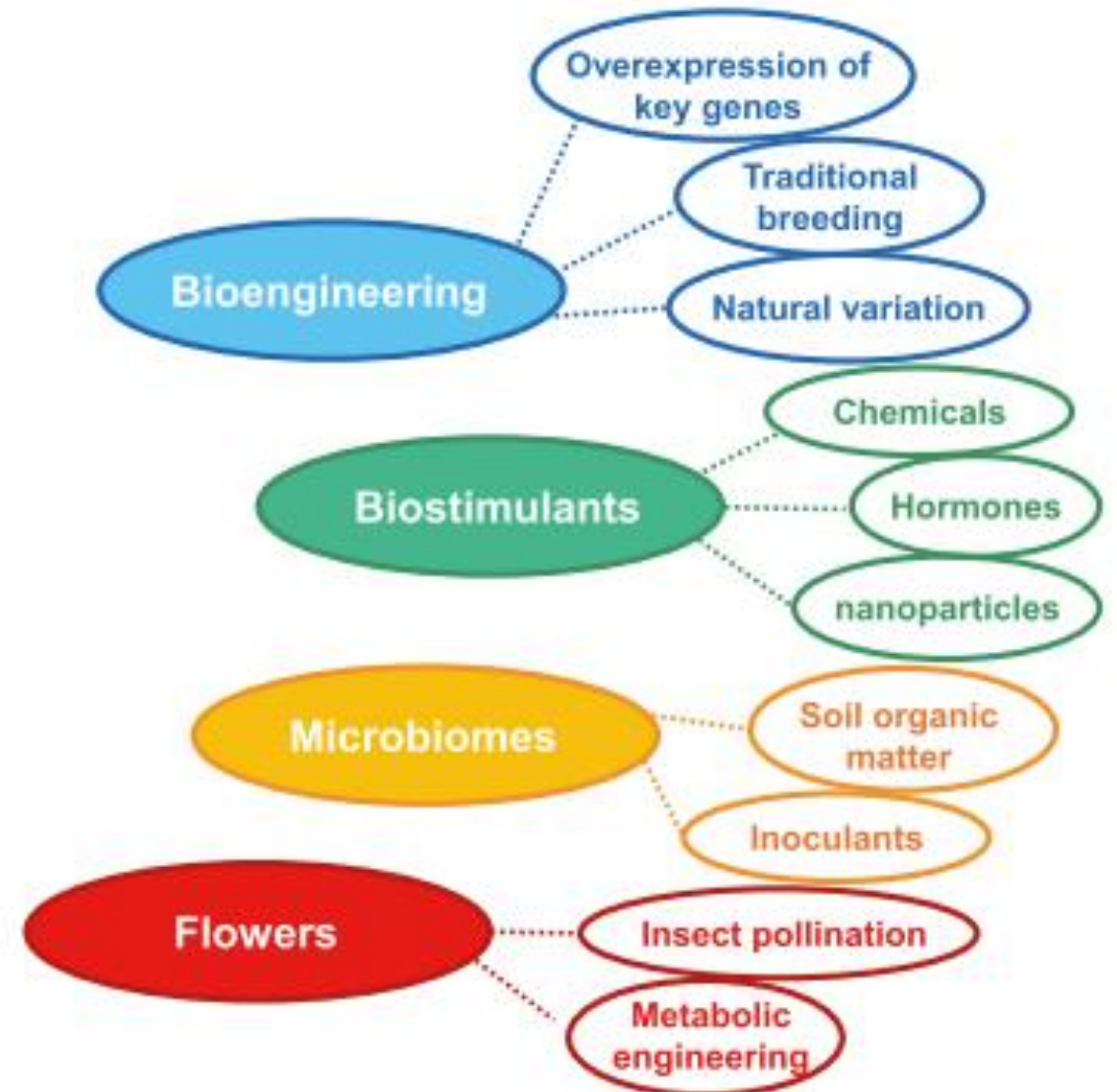


# Scope of the Challenge



Production of high value plant native and non-native ingredients in existing and novel crops on an industrial scale in a cost-effective and environmentally friendly and climate-smart manner.

Possible strategies to develop climate-resilient crops





- Non-GMO TECHNOLOGIES

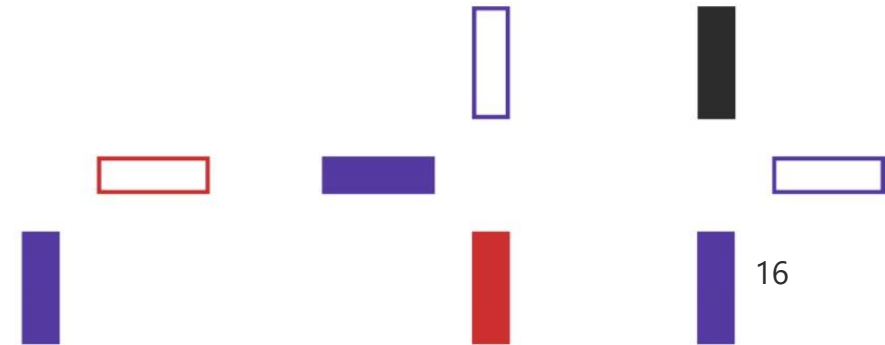
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- NON-TARGETED MUTAGENESIS
- CISGENSIS

---

- Now Genomic Techniques (NGT)
- Gene editing
- Gene design

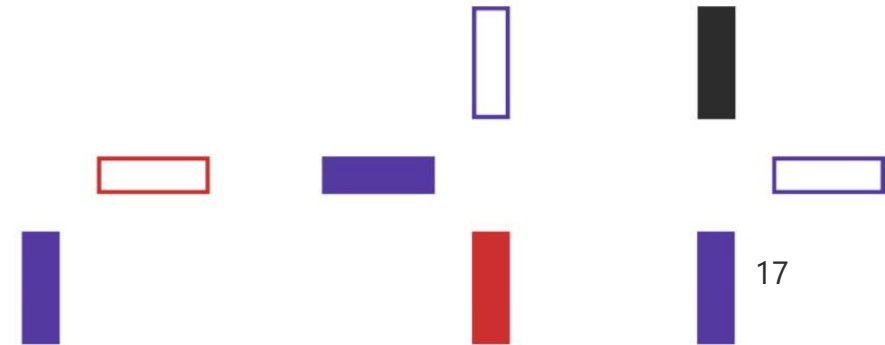
Use of AI can speed-up the selection process and achieve our strategic goals in food security while maintaining agriculture environmentally sound business



# Specific objectives of the Challenge



1. Increasing plant growth, yields and resistance to stress.
2. Increasing the nutritional value in crops through plant native and non-native ingredients in crops.



# Research papers & reports



Search within

Article title, Abstract, Keywords



Search documents \*

biofortification

+ Add search field

Beta

Documents

Preprints

Patents

Secondary documents

Research data ↗

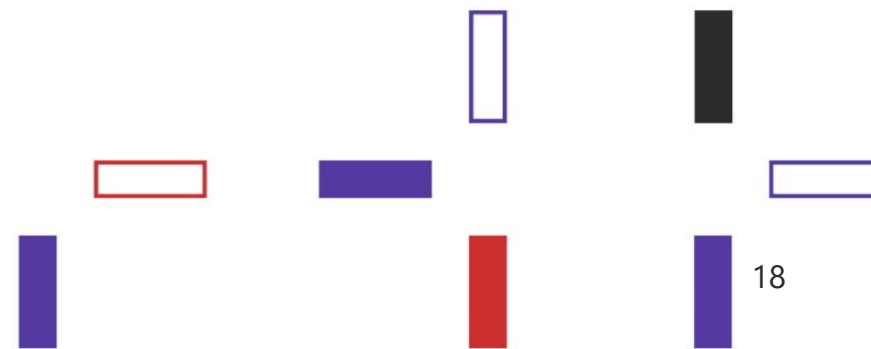
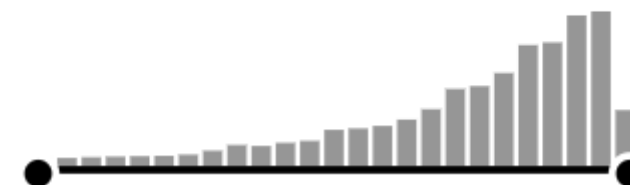
5,335 documents found

Country/territory



<input type="checkbox"/>	India	1,126
<input type="checkbox"/>	United States	943
<input type="checkbox"/>	China	729
<input type="checkbox"/>	Pakistan	357
<input type="checkbox"/>	Brazil	352

Range  Individual



# Research papers & reports



Search within  
Article title, Abstract, Keywords

Search documents \*  
biomanufacturing

+ Add search field

Beta

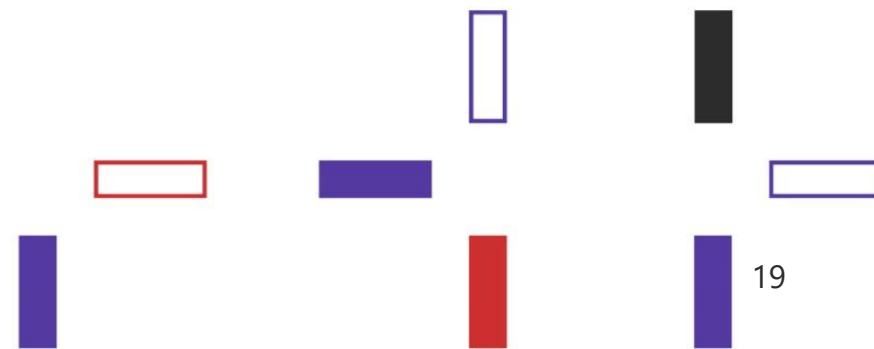
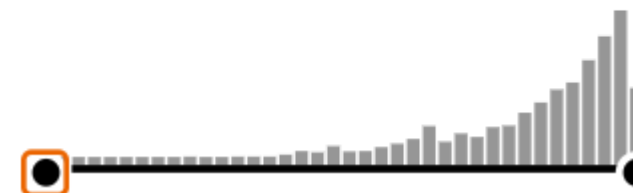
Documents Preprints Patents Secondary documents Research data

2,310 documents found

## Country/territory

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<input type="checkbox"/>	China	448
<input type="checkbox"/>	United Kingdom	212
<input type="checkbox"/>	Germany	146
<input type="checkbox"/>	Australia	72

Range  Individual



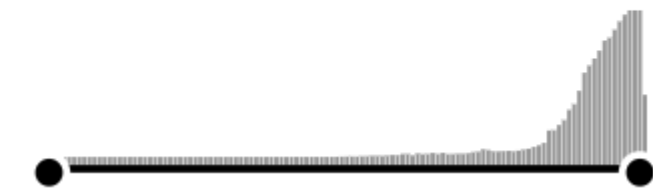
# Research papers & reports



Search within  
Article title, Abstract, Keywords

Search documents \*  
synthetic AND biology

Range  Individual



+ Add search field

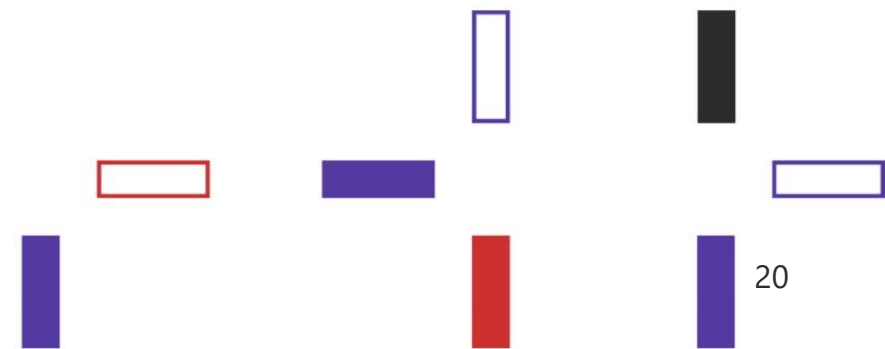
Beta

Documents Preprints Patents Secondary documents Research data ↗

38,774 documents found

Country/territory ^

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<input type="checkbox"/> United Kingdom	4,056
<input type="checkbox"/> Germany	3,171
<input type="checkbox"/> France	1,820





- mutagenesis AND crop\* – 68

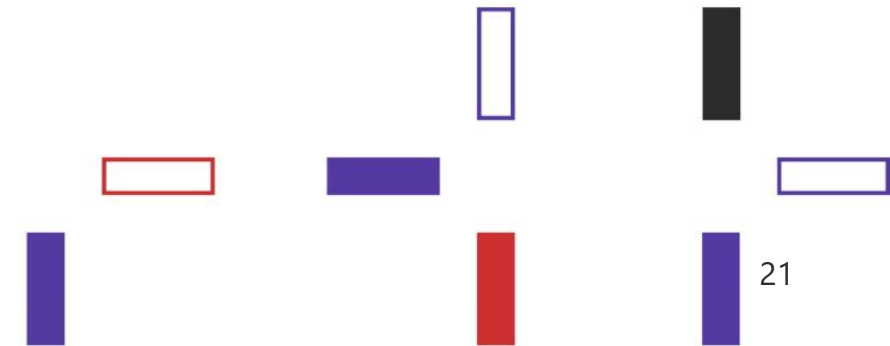
□ CN	61
□ US	6
□ WO	5
□ AU	3
□ EP	3
□ AR	2
□ BR	2
□ CA	2

- mutagenesis AND food - 164

□ CN	126
□ US	22
□ WO	18
□ JP	12
□ EP	7
□ KR	6
□ RU	6
□ AU	4

- mutagenesis AND plant\* - 1047

□ US	516
□ CN	480
□ CA	166
□ WO	126
□ EP	69
□ AU	65
□ JP	54
□ BR	29



21

# Patent landscape

- Biofortification and crops – 3
- Biofortification and plants – 9
- Biofortification and food – 5
- Synthetic biology and crops - 8
- Synthetic biology and plants – 25
- Synthetic biology – not getting right results

The image displays four sequential screenshots of the Espacenet patent search interface, illustrating the results for different search queries. Each screenshot shows the search bar, navigation tabs, and a list of results.

- Search 1:** Query: "ta all 'biofortification and crops'". Results: 3 results found. The first result is "1. PROCESS FOR PROTECTIVE BIOFORTIFICATION OF CRUCIFEROUS CROPS USING SELENIUM RO131176A0 (B1) • 2016-06-30 • INST NAȚIONAL DE CERCETARE-DEZVOLTARE PENTRU ȘTIINȚE BIOLOGI...".
- Search 2:** Query: "ta all 'biofortification and plants'". Results: 9 results found. The first result is "1. COMPOSITION AND METHOD FOR BIOFORTIFICATION OF FOOD PLANTS AND FOOD P... WO2022167375A1 • 2022-08-11 • FABBRICA COOP PERFOSEFATI CEREALIA S C [IT]".
- Search 3:** Query: "ta all 'biofortification and food'". Results: 5 results found. The first result is "1. COMPOSITION AND METHOD FOR BIOFORTIFICATION OF FOOD PLANTS AND FOOD P... WO2022167375A1 • 2022-08-11 • FABBRICA COOP PERFOSEFATI CEREALIA S C [IT]".
- Search 4:** Query: "ta all 'synthetic biology and crops'". Results: 8 results found. The first result is "1. Stress-resistant gene line AcDwEm and application thereof in improving salt tolerance, drought... CN113151293A (B) • 2021-07-23 • BIOTECHNOLOGY RES INST CAAS".
- Search 5:** Query: "ta all 'synthetic biology and plants'". Results: 25 results found. The first result is "1. AUTOTROPHIC NITROGEN FIXATION GENES AND AN AUTOTROPHIC NITROGENASE E... US11597942B2 (A1) • 2023-03-07 • SHANGHAI ACAD AGRIC SCIENCES [CN]".



Query language: en de fr ▾

AND ▾ + Field

Title or abstract ▾ all ▾

→ Group

cisgenesis

×

Search

Reset

☆ WO2020008078A1 METHOD FOR MODIFYING TUBER SHAPE IN POTATO

Patent Translate ▾ ⋮

Bibliographic data Description Claims Drawings Original document Citations Legal events Patent family

Register ↗ **Global Dossier** ↗

**Applicants** HZPC RES B V [NL]; KWS POTATO B V [NL]; UNIV WAGENINGEN [NL]; C MEIJER B V [NL] +

**Inventors** VAN ECK HERMAN [NL]; VAN DER KNAAP ESTHER [US] +

**Classifications**

IPC **C07K14/415**; **C12N15/82**;

CPC **C07K14/415 (EP)**; **C12N15/8218 (EP)**; **C12N15/8261 (EP)**; Y02A40/146 (EP);

**Priorities** NL2021264A-2018-07-06; NL2021271A-2018-07-09

**Application** EP2019068288W-2019-07-08

**Publication** WO2020008078A1-2020-01-09

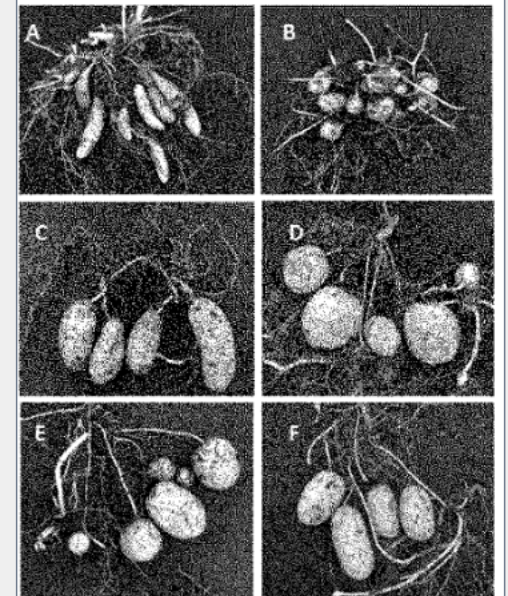
**Published as** WO2020008078A1

EN FR



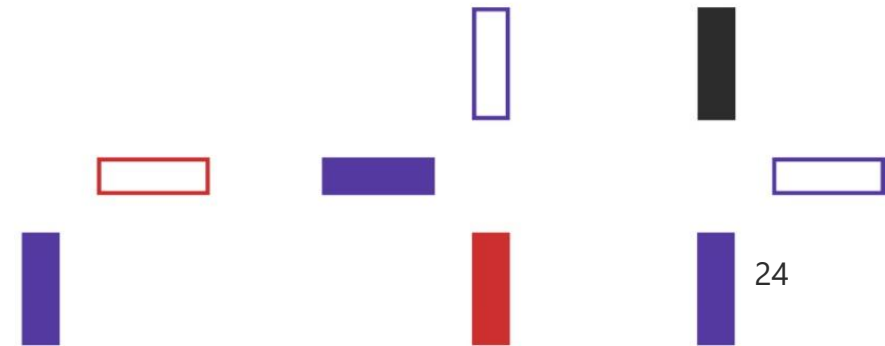
Front-page drawing from WO2020008078A1

Fig. 11





- Horizon Europe Work Programme 2021-2024 - 9. Food, Bioeconomy, Natural Resources, Agriculture and Environment
  - Call 2023: New detection methods on products derived from new genomic techniques for traceability, transparency and innovation in the food system
  - Call 2022: Exploring extreme environments: novel adaptation strategies at molecular level for bio-based innovation
  - Call 2021: New genomic techniques (NGT): understanding benefits and risks – focus on bio-based innovation

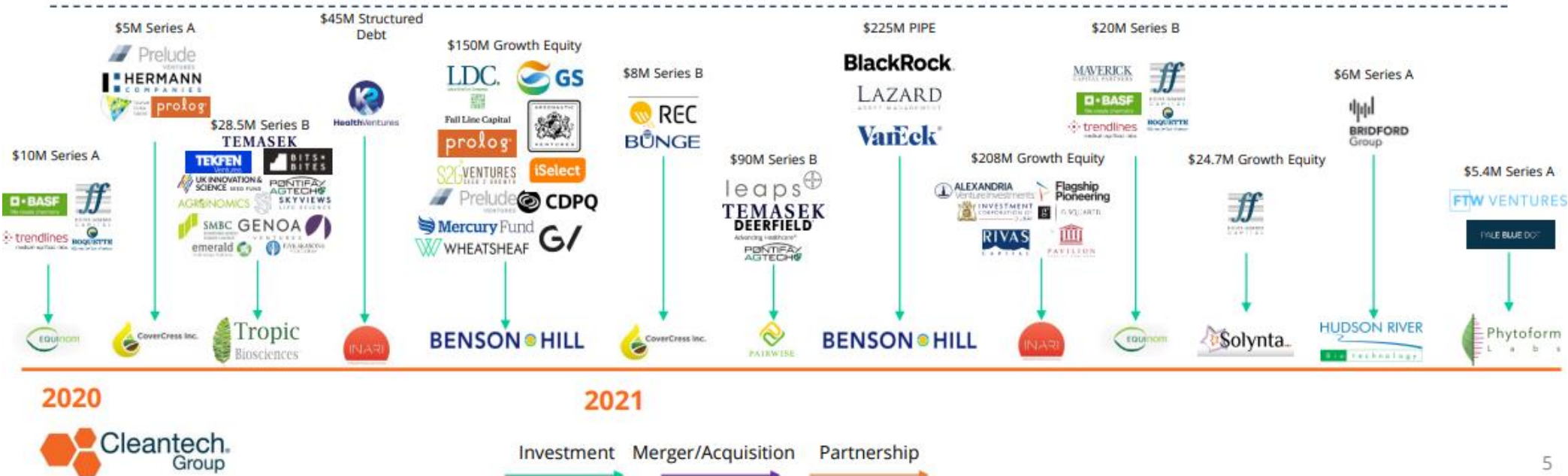




## Crop Genetics: Market dynamics and key innovation deals

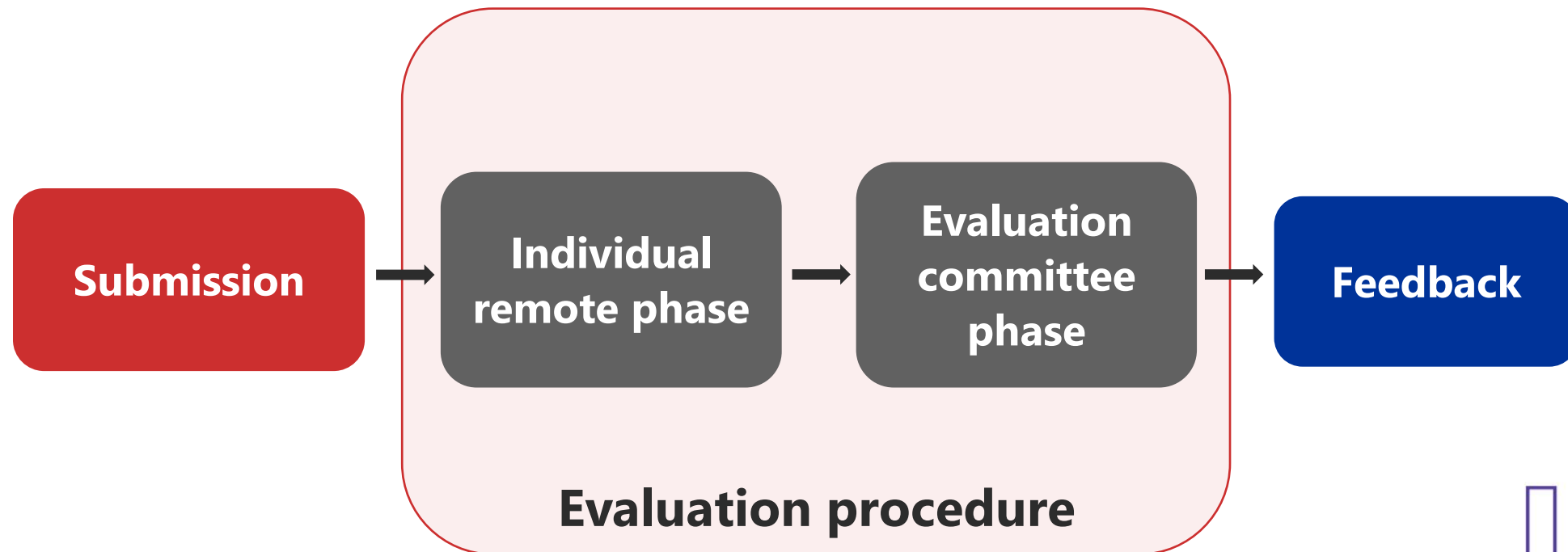
### Market Dynamics

- **Margins increase as you move down the supply chain** with food processors and retailers taking most of the profit for food items, making it difficult for genetic engineering startups to capture value without vertical integration.
- **Companies focusing on quality traits** such as protein content are raising large venture rounds or being acquired by SPACs to fund moving down the supply chain and become seed breeders and distributors.
- **Creating tools to reduce development time** for new traits is attractive to large agricultural incumbents and provides no commercialization risk to the innovator. Development times have reduced from around \$100M and ten years to six months a few million dollars.
- **Creating new traits is expensive and risky** as it is difficult to bring a new seed/trait to market. Typically, this requires licensing or development partnerships with agricultural incumbents.





## Information relevant to Step 2 evaluation





- i. Crops such as but not limited to potatoes, wheat.
- ii. Stress factors combinations such as but not limited to combinations of heat, drought, salinity, flooding, high CO2 levels, altered composition and behaviour of weeds, insects, pathogens and soil microbiome, human-generated pollutants.
- iii. Native or non-native ingredients increasing the nutritional value of the crop such as but not limited to increasing content of potato native protein patatin, introduction of non-native ovoalbumin in potatoes.
- iv. Methodological approach used, e.g. conventional breeding technologies and New Genomic Techniques. Leveraging technologies such as, but not limited to genomics, transcriptomics, proteomics, metabolomics and phenomics. nanoparticle technology, chemistry, and advanced artificial intelligence to speed-up the selection process.



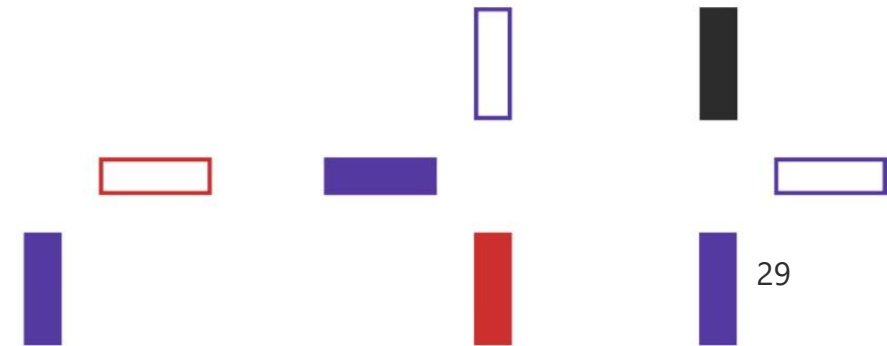
The process of building a balanced and impactful project portfolio will adhere to the following principles:

1. Selected projects for the portfolio should have a diversity in crops as much as possible and should ensure European geographical coverage where these crops are grown, if applicable.
2. At least two main groups in the portfolio will be selected, each one focusing on a specific stress factor combination.
3. A balanced representation of native and non-native ingredients will be sought.
4. In addition, a diversity in core and leveraging technologies will be aimed for.

# Portfolio considerations (II)



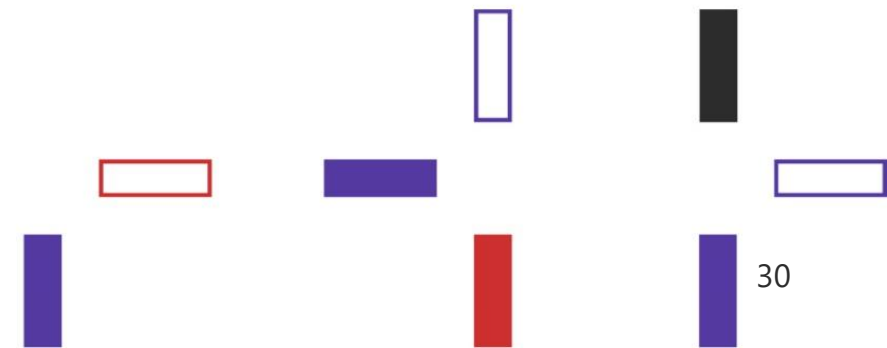
- Projects must develop a complete methodology for assessing the increase of plant growth, yields, and climate resilience to single and multiple stresses, and/or assess changes to the nutritional value of crops.
- Proposals should include multi-omics approaches including genomics, transcriptomics, proteomics, metabolomics and phenomics. These approaches can be further underpinned by leveraging technologies such as, but not limited to nanoparticle technology, chemistry, and advanced artificial intelligence to develop and introduce novel defense and acclimation strategies, currently not present in crops to achieve greater tolerance to harsh environmental conditions and/or biomanufacturing of non-native ingredients, to enable the time required for that development to be significantly shortened.
- Proposals should also look to address the narrow genetic diversity of novel crops and are also expected to consider regulatory aspects and to build on the work carried out so far by the European Food and Safety Authority (EFSA), where appropriate



# Budget and application deadline



- Indicative budget: €30 million
- Grant size: up to €4 million
- The funding rate of this grant is 100% of the eligible costs.
- Work Package on portfolio activities: 10 person-months
- Application deadline: 29 October 2025 at 17:00 Brussels local time via the EU Funding and Tenders portal!



# 4 million € question

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Innovation  
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2020**

**SUNRISE Sustainable Urban Neighbourhoods - Research and Implementation Support in Europe**

ID: 723365

From: 1 May 2017 to: 31 July 2021

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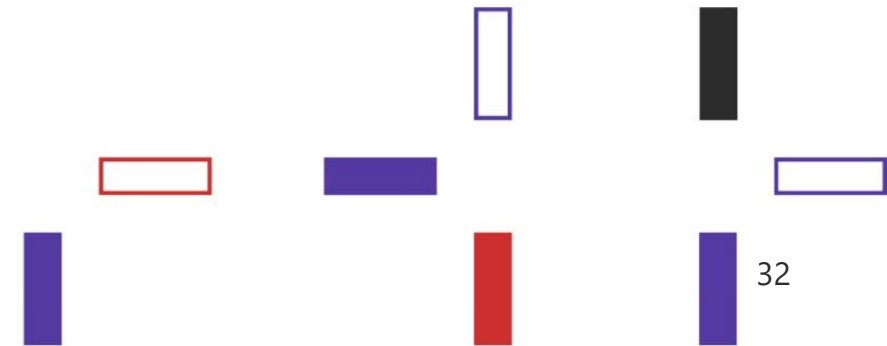
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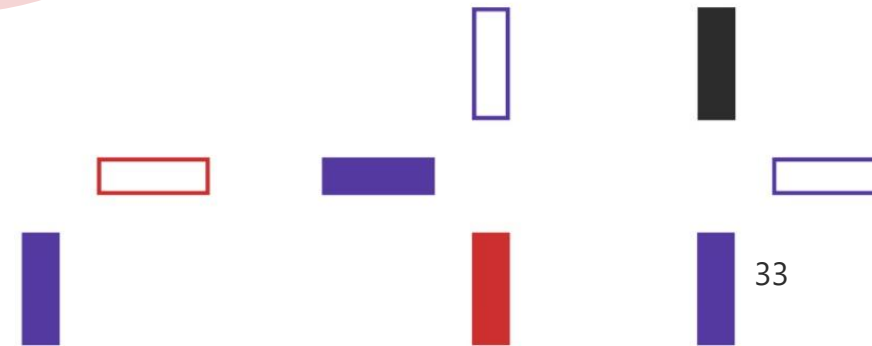
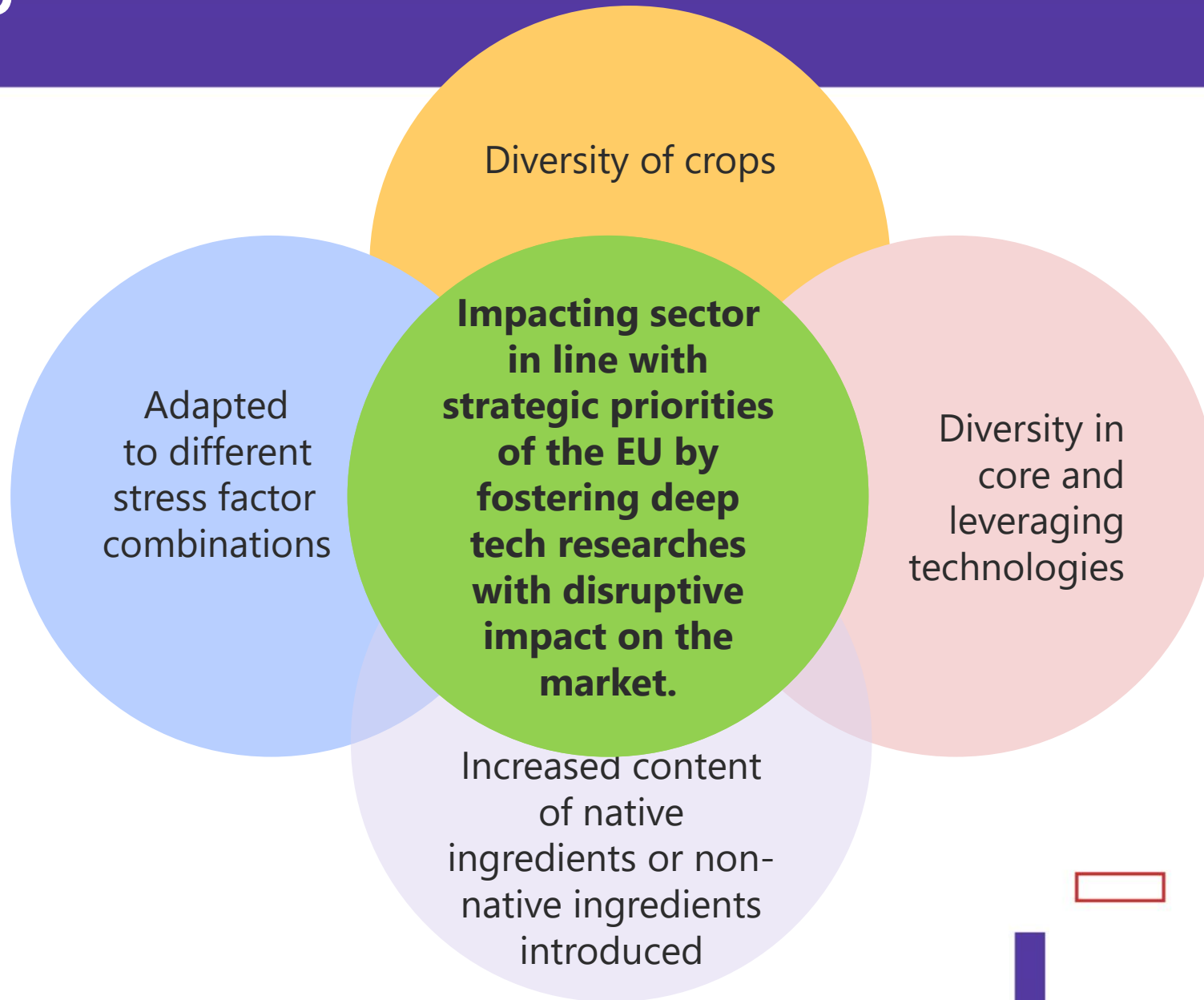
# Expected outcomes and impacts



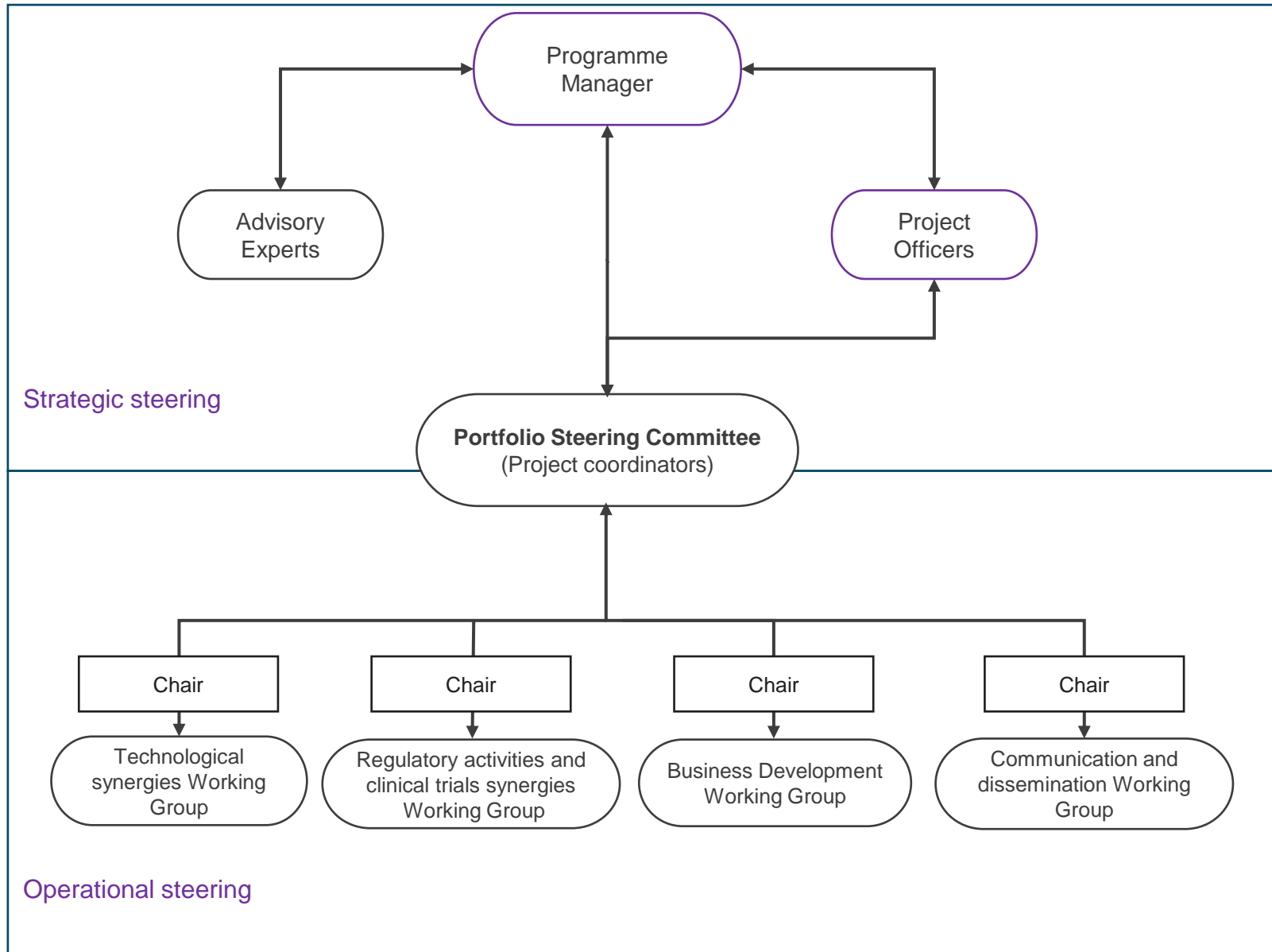
- Utilizing biotechnology to achieve greater tolerance to harsh environmental conditions and biomanufacturing of non-native ingredients represent a paradigm shift in modern agriculture focused mostly on very limited number of conventional crops.
- This is one of the key factors to secure long-term competitiveness of EU Food supply chain.
- Achieving technology advantage.
- Decreasing EU dependency on imports of inputs for primary production, feed and food.



# Challenge overview



# Proactive portfolio management



## Extracted from GA:

“Each consortium will nominate Portfolio Manager, Innovation Manager and Communication Manager.”

“A chair will be nominated for each WG. This chair will be responsible to prepare meeting agendas, links to the meeting and minutes of the meetings. WG Meetings are expected to be online and to be scheduled approximately every 3 months.”

Extreme summer droughts: A major threat to Europe's economy this year? | DW News



Help us transition EU agriculture towards sustainability in harsh environmental conditions and resource scarcity!

Europe braces for severe drought this summer

DW NEWS

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**EIC Pathfinder challenge call  
'Biotech for Climate Resilient Crops and  
Plant-based Biomanufacturing'  
closes on 29<sup>th</sup> Oct. 2025**





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# Thank you!

<https://eic.ec.europa.eu>

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