

CropBooster-P

*Roadmap to future-proof
European crops*

Citizens deliberation and verdict on using
NGTs to design the crops for the future



European
Commission

Horizon 2020
European Union funding
for Research & Innovation

The CropBooster-P citizens juries

- Assess the desirability of NGTs for crop improvements;
- Reach a reasoned judgement on having NGTs for improving crops
 - build bonds of trust among citizens which can effect changes in political attitudes and behavior
 - reduce conflict in policy formulation and decision-making
 - make better, longer lasting, and wiser policy choices



The CropBooster-P citizens juries

- Formed two online CropBooster-P citizens juries one in the
 - Netherlands – 11 citizens
 - United Kingdom – 10 citizens
- We engaged citizens via recruitment agencies
 - Ages of 20-65
 - From uneducated to high school and university graduates
 - Equal gender (M/F) balance
 - Had no prior knowledge about plant breeding



The citizens jury: Protocol: Day 1-3

- Presentation explaining our findings were made to the public
 - WP1 – New Genomic Techniques (NGTs) and the state of the art in crop improvements
 - WP2 – Expert and stakeholder perspectives on the impacts of crop improvements
 - WP3 – Consumer and societal acceptability of NPBTs for crop improvements
- Citizen's deliberation & question formulation session in smaller groups



The citizens jury: Protocol: Day 1-3

- CropBooster-P Work Package presentations were complimented by expert witness testimonies

	Dutch jury	UK jury
Day One	Plant physiology	Plant physiology
Day Two	Responsible innovation in biotechnology	Plant biotechnology & society studies
Day Three	Biotechnology, culture & planning	Environmental economist

- The floor was then open to citizens to cross examine the experts and ask questions that need answering
- The deliberation session, and the Q&As or cross examinations lasted about two hours each day



The citizens jury: Protocol: Day 4

Argument based reasoning for verdict formulation

It starts with a brainstorm in the SWOT matrix, and ends with a series of questions to get at the "now what?" stage of decision-making. This will be based on an interpretation of information brainstormed at the beginning.

1 Brainstorm strengths, weaknesses, opportunities and threats of crop improvements here

Ideally, work in an S-shaped flow. Start with strengths, then move to weaknesses, then opportunities, and finally threats. Add one idea per sticky note. Add as many stickies as they want in the given time limit.

⌚ 10 minutes for each section

[illegible]

2 Drag and drop items that are the most important to you in the box below

The diagram illustrates the factors influencing the creation of a global business motive. The central node is "The creation of global business motive". It is surrounded by several other nodes, each with a different background color and containing text. The nodes are connected by lines, indicating a relationship between them. The nodes are:

- Economic growth and rising living standards** (top left, light blue)
- Rising income levels** (top right, light blue)
- Rising income levels** (middle left, light blue)
- Rising income levels** (middle right, light blue)
- Rising income levels** (bottom left, light blue)
- Rising income levels** (bottom right, light blue)
- Rising income levels** (bottom center, light blue)
- Rising income levels** (bottom left, light blue)
- Rising income levels** (bottom right, light blue)
- Rising income levels** (bottom center, light blue)

⌚ 10 minutes for ranking/voting

3 Evidence based reasoning for verdict formulation

Discuss and answer the following questions to start deciding on your stance on NPBTs.

⌚ 10 minutes for each section

<p>Strategic planning</p> <p>Do the risks outweigh the benefits, or do the benefits outweigh the risks?</p> <p>The benefits outweigh the risks because we can get higher yields and consistency in plant output. It can help reduce hunger in the world and end hunger. It improves equality and productivity in humans. Better farm output in Europe can help respond to food emergencies in the world.</p>	<p>What are the most critical issues that have led you to support or oppose new plant breeding for crop improvements?</p> <p>World hunger, the rigor in science and safety standards in EU, climate change, the benefits to economies of the world</p>												
<p>What would need to happen to change your mind supporting or rejecting new plant breeding for crop improvement?</p> <p>Increase allergic reactions or any negative effects would cause opposition.</p> <p>Rigor in testing would help support NPBTs</p> <p>Safe& realistic plans deployment of the technology would lead to its support</p> <p>Other successful future alternatives that reduce reliance on NPBTs</p>	<p>What do you think about breeding new plants and improving crops?</p> <table border="1"> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>												

Place a green stick with your name if you are inclined to support it
Place a pink sticky if you are partially for and against Place a yellow sticky if you are undecided
Place an orange sticky if you are opposed new plant breeding & crop boosting

Selected results – Most important SWOTs

- Strengths: Develop plants that have higher yield, nutrition & more resistance to (a/)biotic stressors
- Weaknesses: i) develop plants with unintended consequences & ii) NPBTs research fails to engage with societal expectations
- Opportunities: i) Higher food and nutritional security, ii) better varieties & iii) reduced environmental impacts
- Threats: i) the lack of will & mistrust in governments & ii) monopolisation



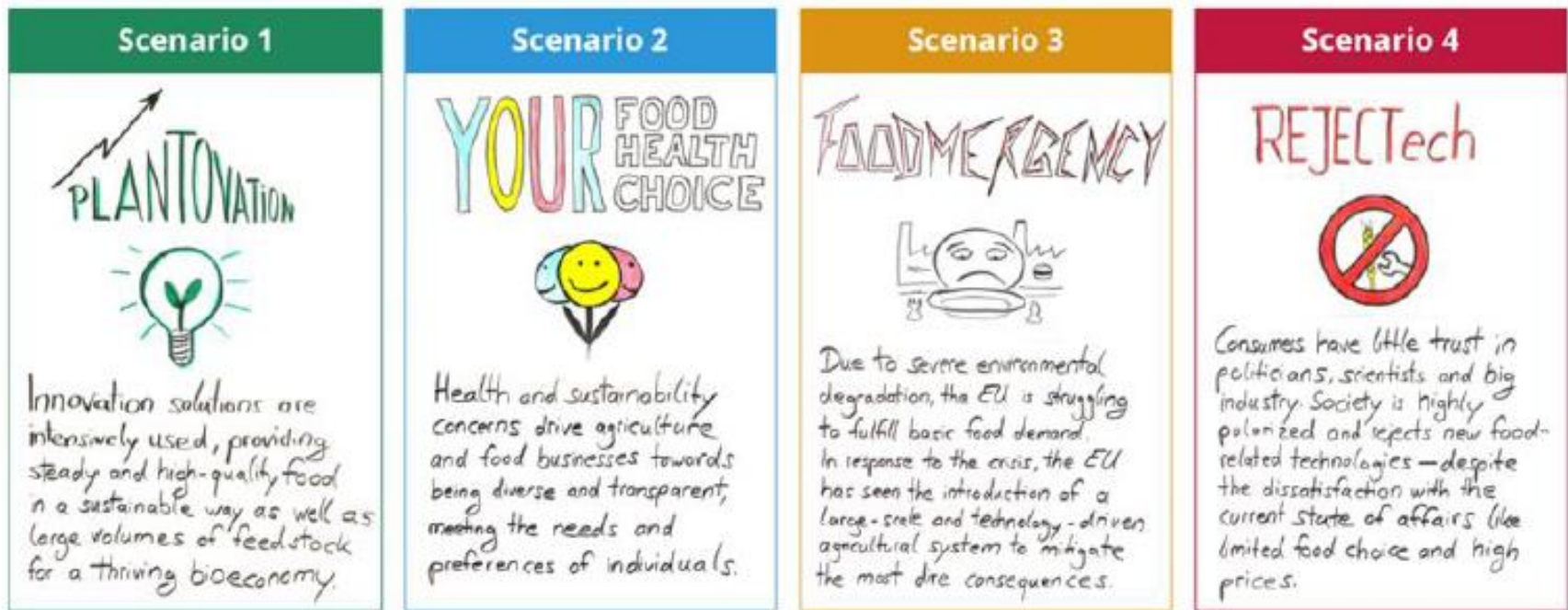
Selected results – Reasoning in support or against NPBTs

- Do the benefits outweigh risks? – **Yes**
 - Higher yields & consistent plant output
 - Reduce / eliminate hunger
 - Europe can help respond to food emergencies in the world
- What are the critical factors that led you to support or reject NPBTs?
 - the rigor in science and safety standards in EU
 - NPBTs can help achieve food independence and the nutritional security
 - Lack of transparency and past experience with GMOs



Selected results: Polls on the current and future scenarios of NGTs

- What is the current state of affairs with NPBTs in Europe?

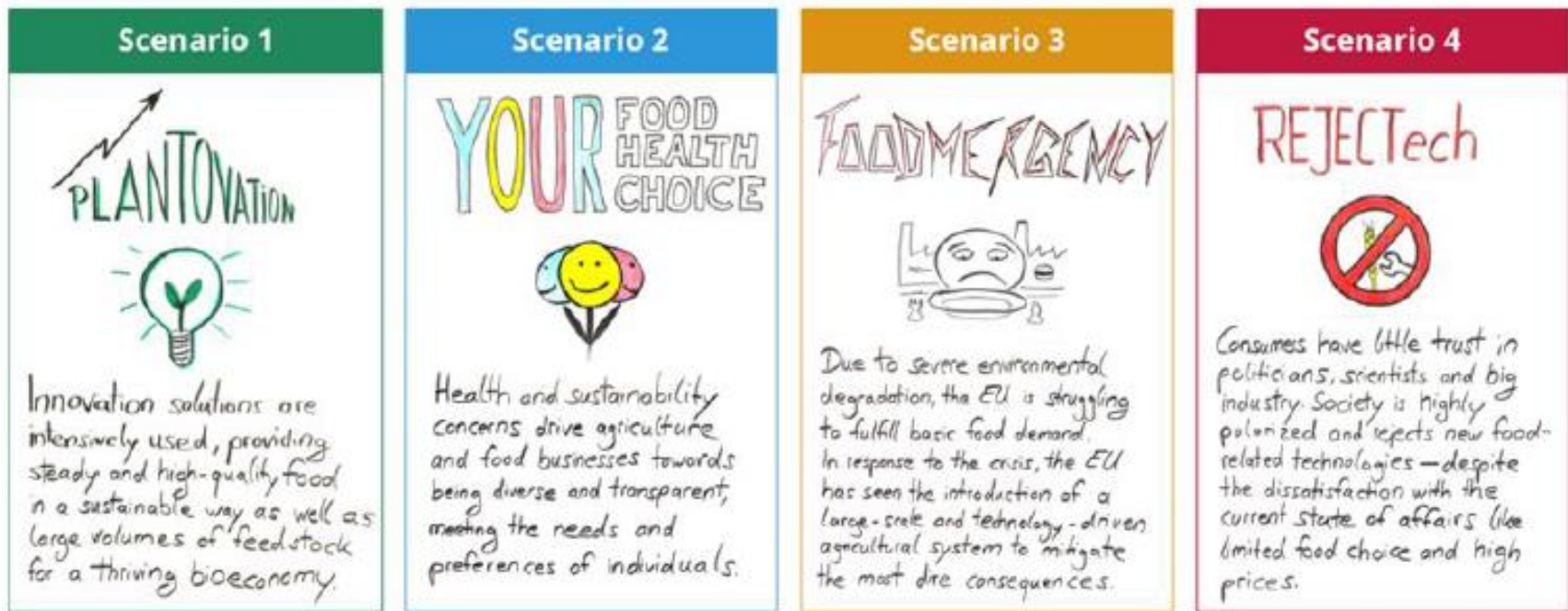


- Dutch jury: **Option 4 - 93% chose option D** & Option C - 7%
- UK jury: **Option 4 - 50%, Option 1 & 2 - 25% each**



Selected results: Polls on the current and future scenarios of NGTs

■ Where are we heading with NPBTs in Europe?



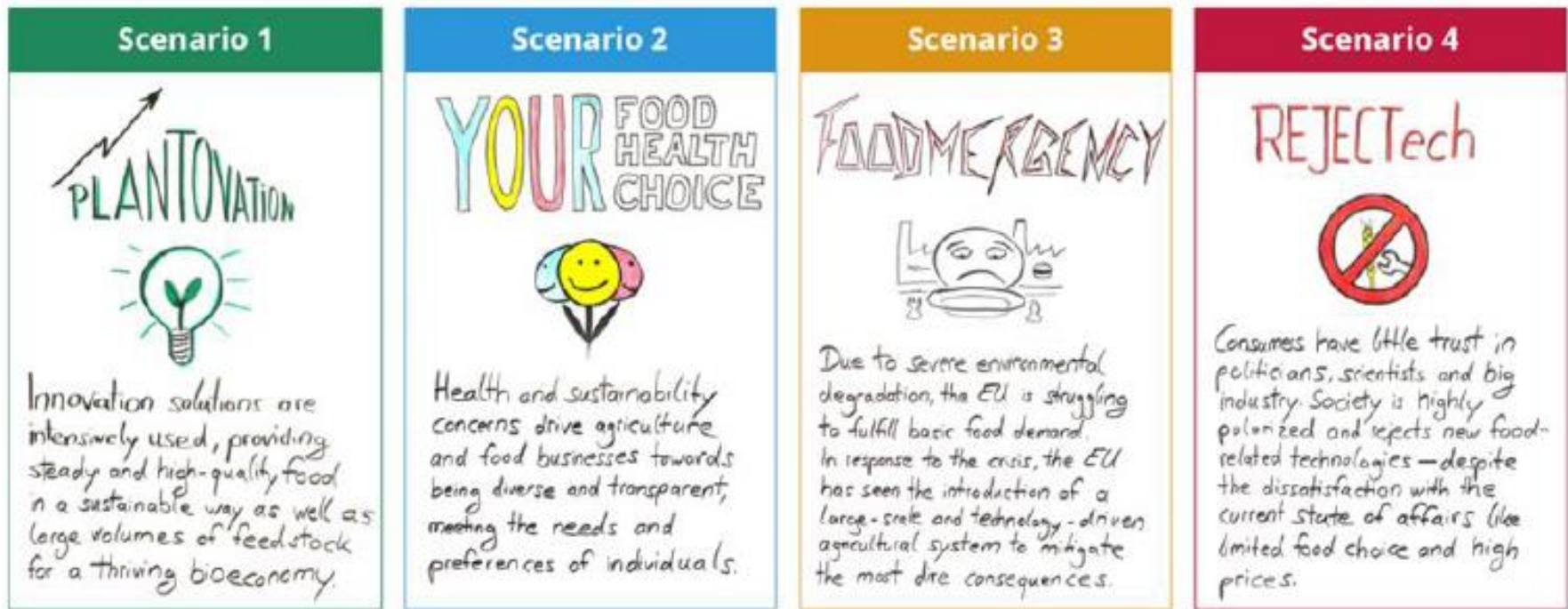
● Dutch jury: **Option 3 - 60%** & **Option 2 - 40%**

● UK jury: **Option 1 - 57%** & Options, B, C, & D - 14% each



Selected results: Polls on the current and future scenarios of NGTs

■ What is the most desirable path for NPBTs?



- Dutch jury: **Option 1 - 70%**, Option B - 10%, Option C - 20%
- UK jury: **Option 1 - 75%** Option, Option B - 12%, Option C - 12%

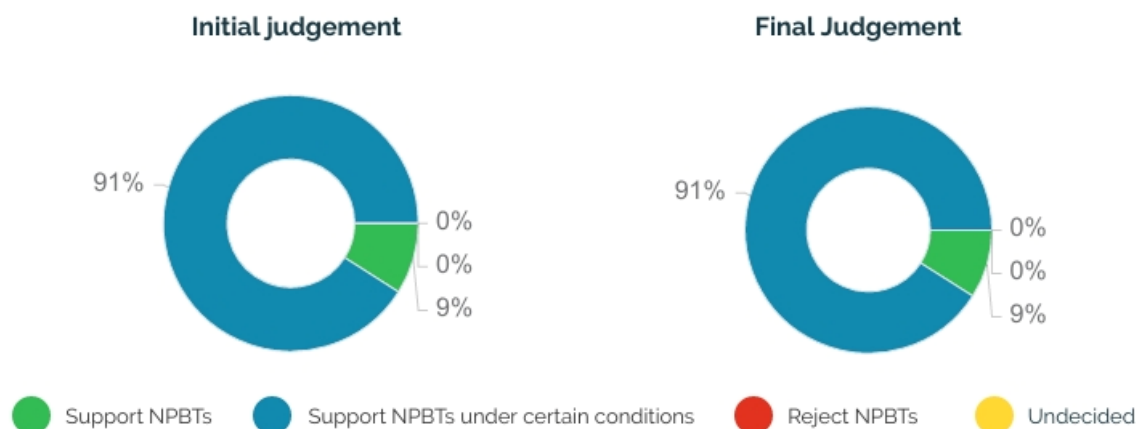


Selected results – Dutch Jury Verdict

■ Are you inclined to...

- support NPBTs
- support NPBTs under certain conditions
- reject NPBTs or
- remain undecided

Are you inclined to...

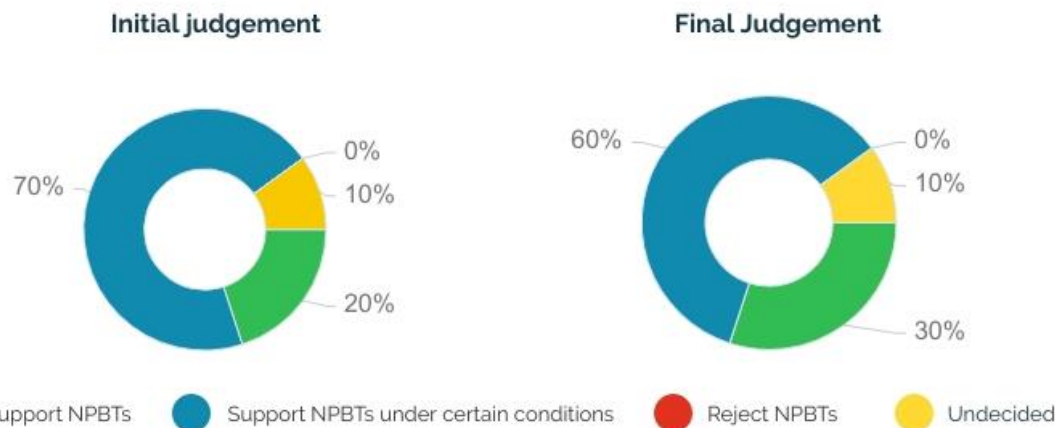


Selected results – UK Jury Verdict

■ Are you inclined to...

- support NPBTs
- support NPBTs under certain conditions
- reject NPBTs or
- remain undecided

Are you inclined to...



Selected results – The conditions

- Technology should be **accessible to all** and used to solve humanitarian problems first rather than breed crops for solely maximizing profits
- There must be a **regulatory framework** and standards that support the development of NPBTs
- Governments needs to be pro-active in **assessing the ethical, economic and environmental benefits** the technology can bring.
- The food made with these techniques must be at least as **safe and nutritious** as current comparable products.
- This technology must have the **same or less climate impact** per product (weight) compared to current comparable products.
- Dutch citizens assumed more corporate responsibility (conditional on that it was checked by governments), English more control and enforcement.



Thank You!

