HEALTHY **PLANTS**
HEALTHY **PEOPLE**
HEALTHY **PLANET**

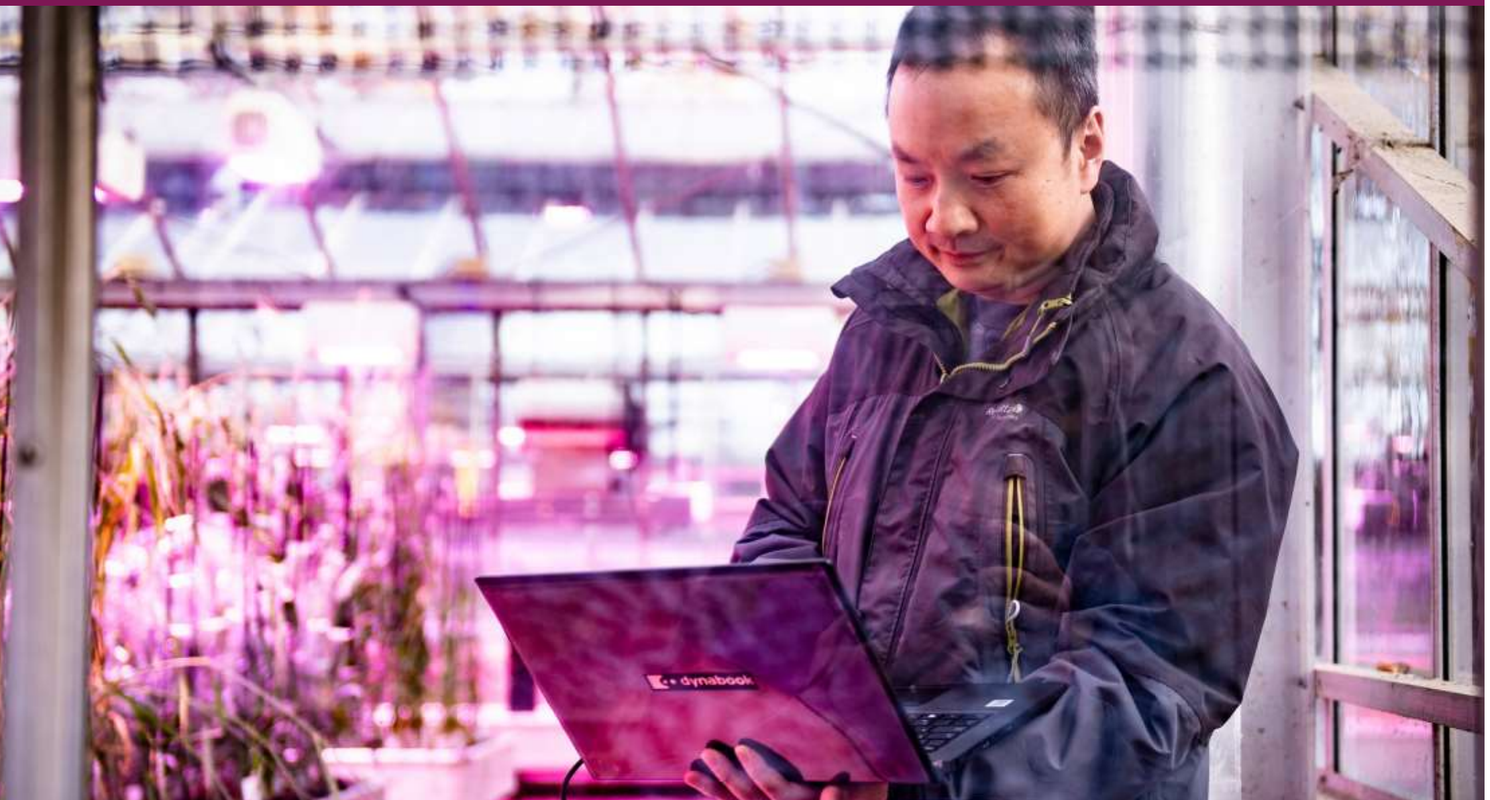
John Innes Centre

TheSainsburyLaboratory

TSL

ONE VISION, **TWO CENTRES OF EXCELLENCE**

The John Innes Centre and The Sainsbury Laboratory are world leaders in plant, soil and microbial research



HP3 **HUB**

HP3 is a big vision. And we have big plans to make it a reality.

We are creating a one-of-a-kind international hub for plant and microbial innovation.

"The HP3 hub is uniquely placed to address some of the greatest challenges facing humanity"

Sir Tom Hughes-Hallett
Chair of the Governing Council, John Innes Centre

“The crises of climate change, biodiversity loss and food security are deeply interconnected. From soil to crop genetics, the brilliant people at the John Innes Centre are changing the way we understand nature – and using that knowledge to devise the next generation of science-led solutions for sustainable food production.”

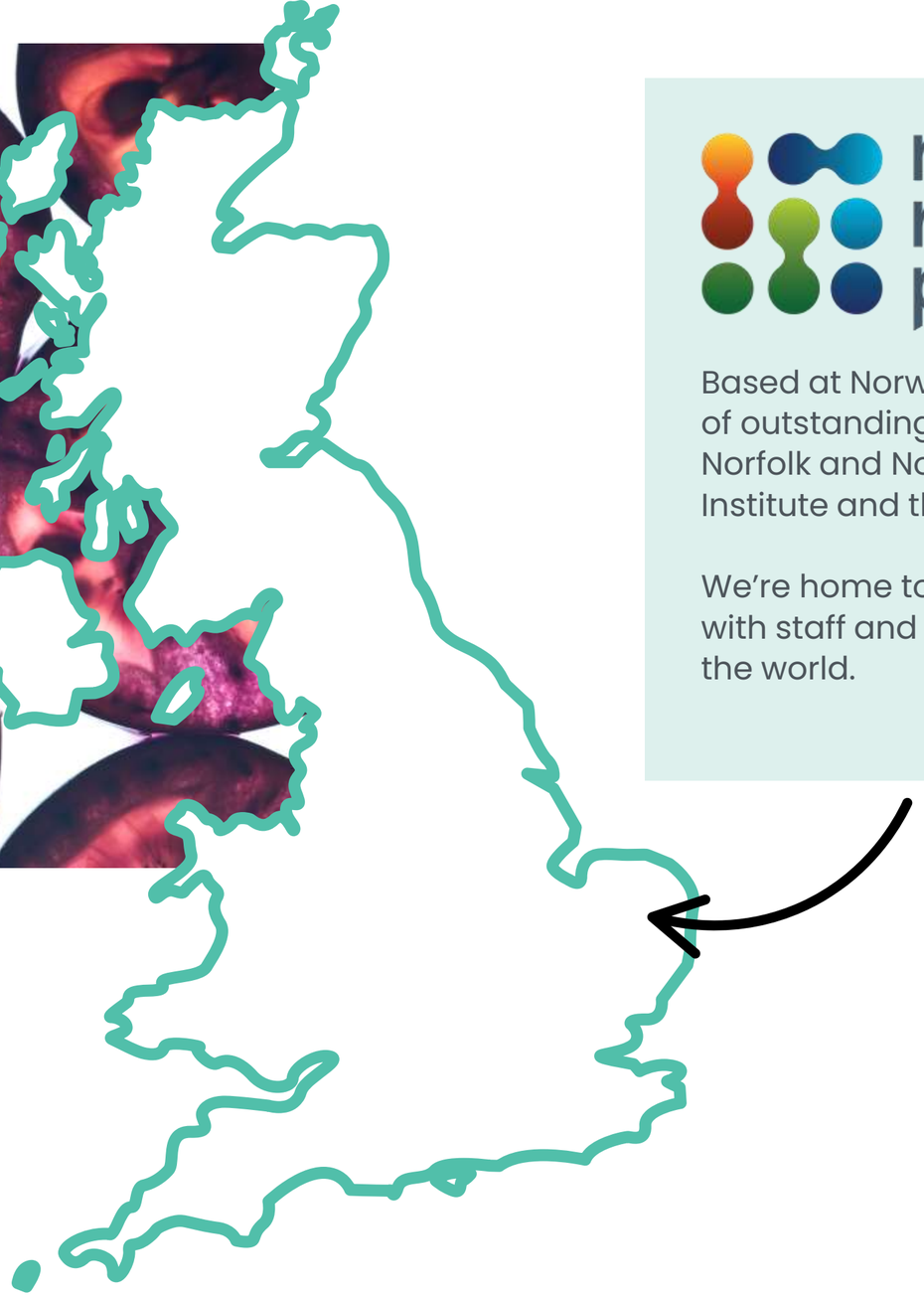
Henry Dimbleby
Author of the National Food Strategy and Managing Partner of Bramble Partners

THE CHALLENGES **WE ARE ADDRESSING IN PARTNERSHIP**

The only way to address the unprecedented challenges that society faces is to come together in partnership with representation across scientific research, policy making, industry and farming.

With the creation of our HP3 Hub, we aim to lead the field and bring together the talent, tools and resources to advance science and technology in new and exciting ways and work with our partners to roll out real solutions.

- Food security and sustainable agriculture
- Nutrition and health
- The climate crisis



norwich research park

Based at Norwich Research Park with an network of outstanding partners the: Earlham Institute, Norfolk and Norwich University Hospital, Quadram Institute and the University of East Anglia.

We're home to more than 40 research groups, with staff and students from 42+ countries around the world.

John Innes Centre
Unlocking Nature's Diversity

The Sainsbury Laboratory
TSL
Plant Health Discovery for a Sustainable Future

Our scientists have been awarded many extraordinary accolades including several Wolf Prizes, The Rank Prize and The Novozymes Prize.

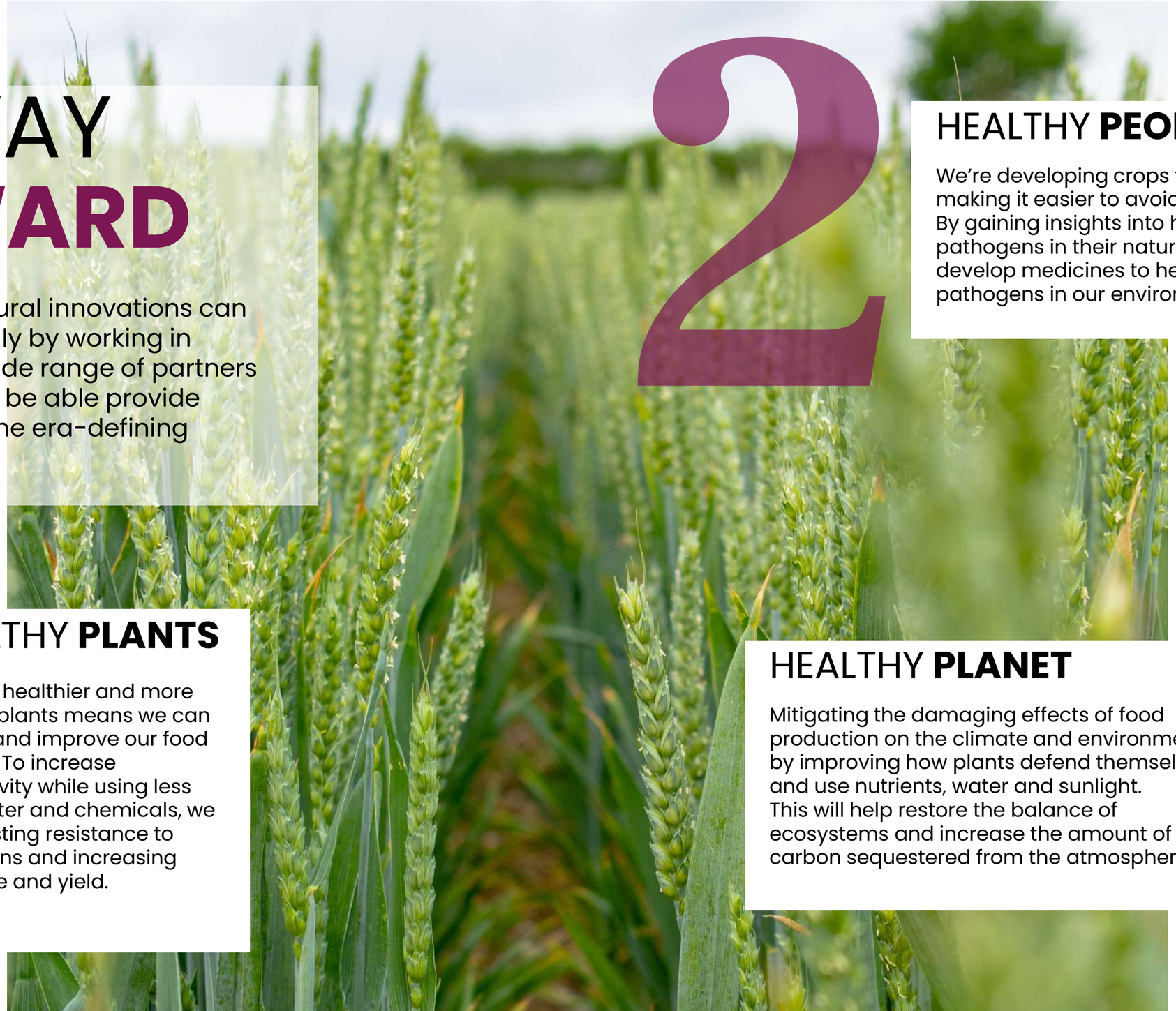
Twelve of our scientists are Fellows of the Royal Society

"We must diversify our crops and reduce reliance on meat consumption for sustainability, human health and the health of the planet."

Professor Graham Moore
Director, John Innes Centre

THE WAY **FORWARD**

Science-led agricultural innovations can lead the way, and only by working in partnership with a wide range of partners and expertise will we be able provide holistic solutions to the era-defining challenges we face.



1

HEALTHY **PLANTS**

Growing healthier and more resilient plants means we can protect and improve our food sources. To increase productivity while using less land, water and chemicals, we are boosting resistance to pathogens and increasing plant size and yield.

2

HEALTHY **PEOPLE**

We're developing crops that are more nourishing, making it easier to avoid malnutrition-based illness. By gaining insights into how plants interact with pathogens in their natural environment, we can develop medicines to help humans combat pathogens in our environment too.

3

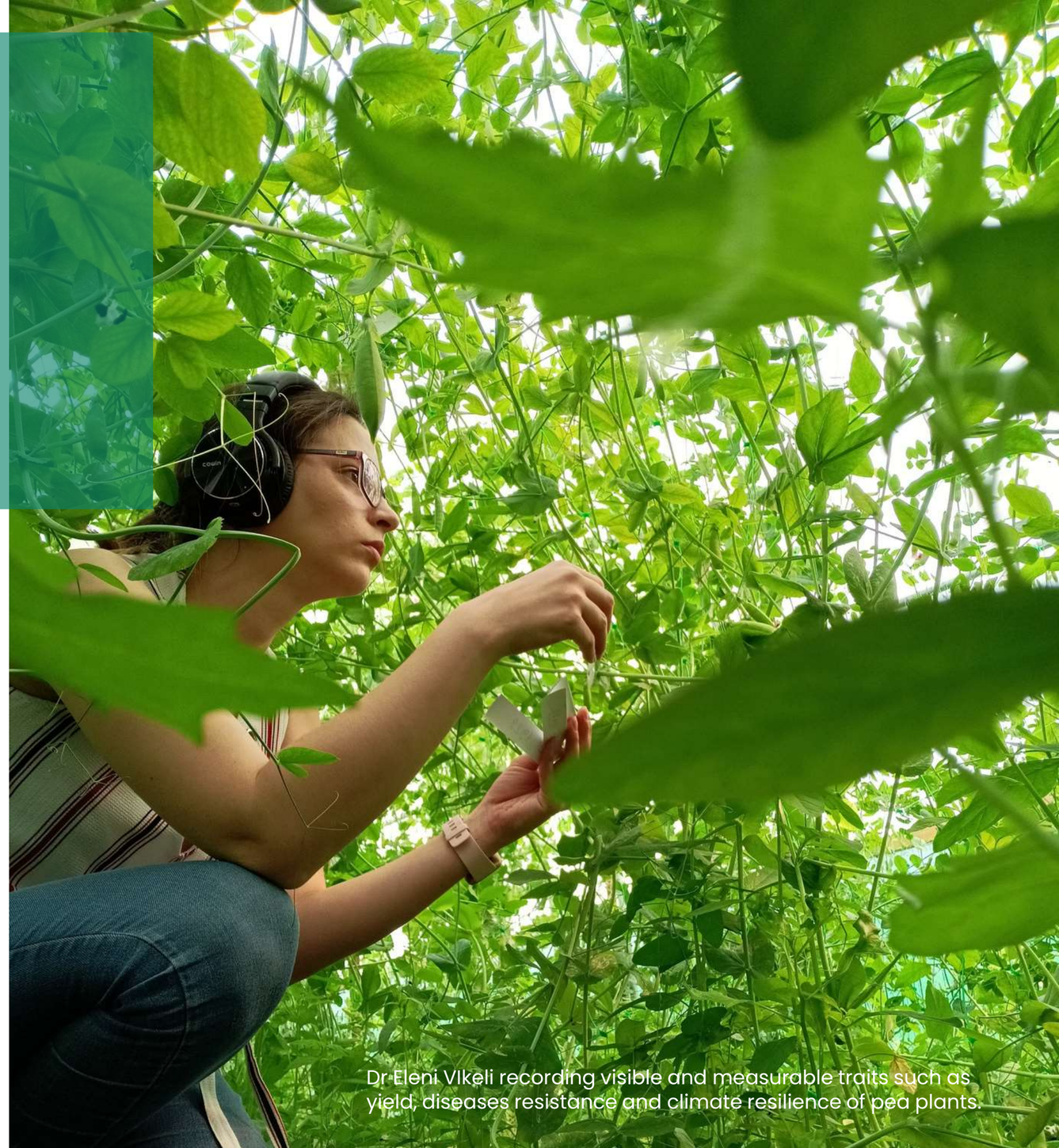
HEALTHY **PLANET**

Mitigating the damaging effects of food production on the climate and environment by improving how plants defend themselves and use nutrients, water and sunlight.
This will help restore the balance of ecosystems and increase the amount of carbon sequestered from the atmosphere.

HP3
IN ACTION

Healthy Plants, Healthy People, Healthy Planet has only just begun, and we have so much more planned. Here's a small selection of some of the major scientific breakthroughs we've already made.

- Averting harvest disasters
- Fixing nitrogen to help fix the climate
- Saving trees, biodiversity and human lives
- Combatting vitamin D deficiency
- Increasing wheat yield to meet global demand



Dr Eleni Vlkeli recording visible and measurable traits such as yield, diseases resistance and climate resilience of pea plants.

AVERTING HARVEST DISASTERS

Wheat Blast

Sharing knowledge is power.

When a new wheat disease, wheat blast, struck Bangladesh in 2016, there was widespread panic and fields were burned in response.

Professor Sophien Kamoun FRS and colleagues at The Sainsbury Laboratory, quickly identified and established its movement across the globe and led responses and training of scientists in South Asia and sub-Saharan Africa.

PotatoPlus

Protecting a family favourite.

Varieties of potato that are completely resistant to late blight in the UK are well on their way to reducing or eliminating the need to spray for late-blight control fungicides.

Family favourites, the Maris Piper and Charlotte, precision bred to be late blight-resistant will enable farmers to dramatically reduce the application of fungicides to control this devastating disease and will stimulate the seed potato production industry in England.

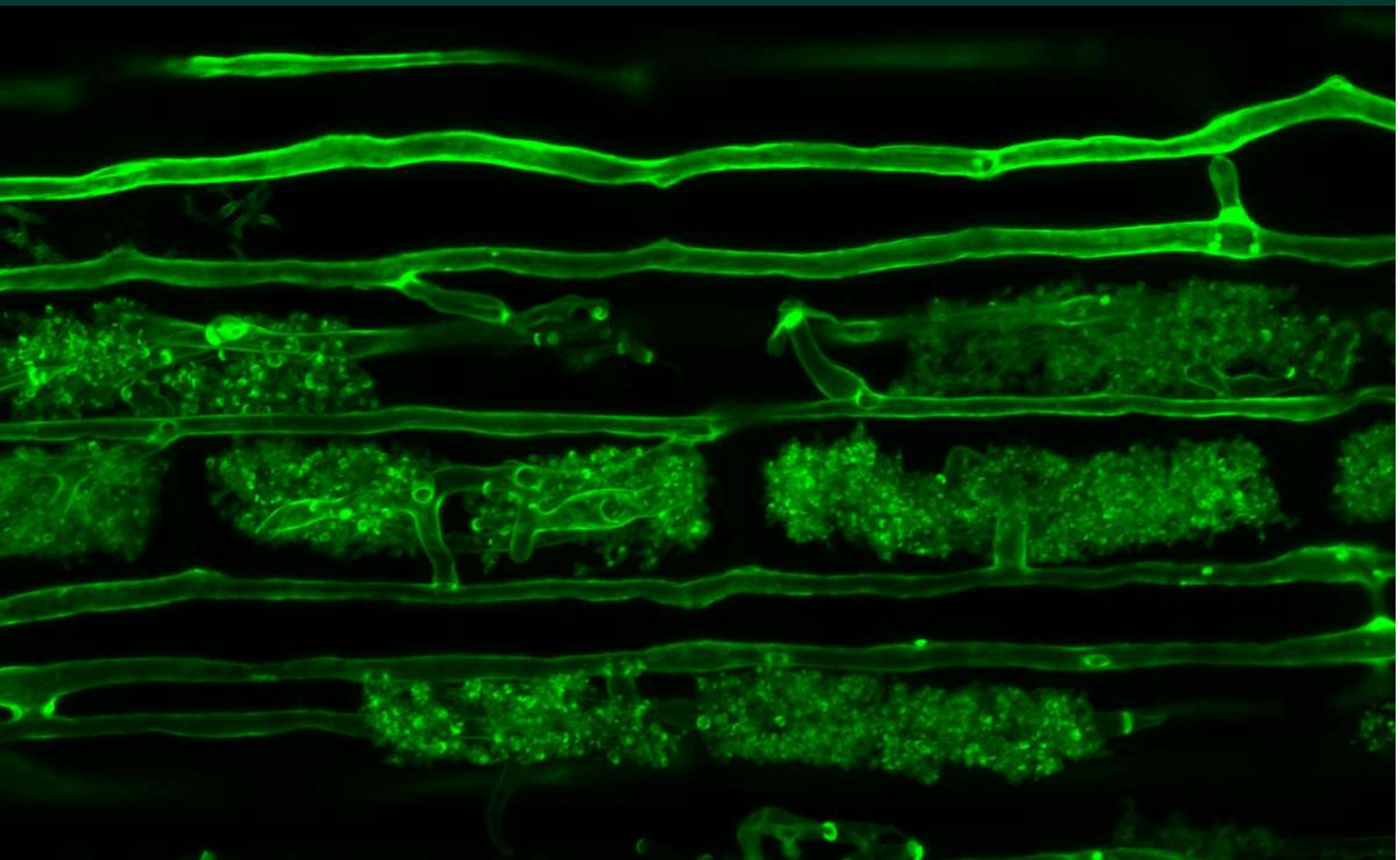
MARPLE

Providing a rapid response to plant disease outbreaks.

A diagnostics methodology developed by Professor Diane Saunders OBE, in collaboration with CIMMYT, provides valuable insights to inform disease management systems and allows a rapid response to a pathogen outbreak.

MARPLE is a portable near real-time diagnostics system that analyses the wheat rust's genome to determine which strains are present and inform a targeted response. The results are generated in just two days, making it ideal for responding to crop disease emergencies in field.

FIXING NITROGEN, **TO HELP FIX THE CLIMATE**



A biological mechanism that improves the relationship between plant roots and beneficial soil microbes has been discovered by Dr Myriam Charpentier.

The John Innes Centre team isolated a gene mutation that enhances a plant's partnership with nitrogen-fixing bacteria and increases nutrient uptake. They then applied this genetic mutation to wheat, giving the same beneficial effect.

This extraordinary discovery could mean less reliance on fertiliser, and paves the way for more environmentally-friendly farming practices.

SAVING TREES, BIODIVERSITY **AND HUMAN LIVES**

When it comes to the Chilean soapbark tree, medicine does grow on trees.

The soapbark tree (*Quillaja saponaria*) contains saponins, which are powerful adjuvants that increase the effectiveness of vaccines for illnesses like Malaria, Covid and Shingles. Until recently, saponin extraction came at the cost of the trees themselves and the ecosystems around them.

Along with international partners, Professor Anne Osbourn FRS (pictured) has isolated and mapped the elusive soapbark genes and enzymes that produce the vaccine-boosting molecules.

Her team has now reconstituted this genetic pathway in another plant, Nicotiana benthamiana, so we can use the soapbark's medicinal properties without needing to touch the trees themselves.

COMBATTING **VITAMIN D DEFICIENCY**

Professor Cathie Martin FRS has identified a way to help address this by using gene-editing to grow tomato plants biofortified with higher levels of vitamin D.

In the UK, almost 20% of children and one in six adults have vitamin D levels below Government recommendations.

Just two fruits provide 20% of the RDA, and the vitamin D-rich leaves could be used to make vegan-friendly supplements. The patent is pending for this remarkable discovery.

SECURING WHEAT YIELD

Wheat is critical for global food security and provides over 20% of human calorie and protein intake. However, a changing climate, diseases, pests and a growing population threatens the future of this vital harvest.

Heritage wheat provides a goldmine of diversity

The A.E. Watkins landrace collection of bread wheat represents the most comprehensive collection of historic wheat anywhere in the world.

At least 60% of the genetic diversity found in this collection is unused in modern wheat crops, and now we can use it to sustainably feed a growing global population.

Dr Simon Griffiths, lead of the Delivering Sustainable Wheat programme at the John Innes said, “The traits from Watkins’ collection can now be used to bolster wheat crops for the future in the UK and worldwide.”

Increasing wheat yield to meet global demand

Using multiple state-of-the-art genetic approaches, Professor Cristobal Uauy (pictured) and partners unlocked some of the wheat genome’s hidden potential to increase yield. Controlling the genetic mechanism that determines seed size means increases in grain weight of up to 13% are now possible.

PARTNERSHIPS **FOR PROGRESS**

We can only do what we do because of our generous donors and funders.

Thanks to their progressive vision and initial investment of £51m, we secured UKRI Infrastructure Fund investment of £317.7m. As a result HP3 is underway.

OUR DONORS

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UEA University of East Anglia

John Fairbairn,
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OUR RESEARCH FUNDERS AND SUPPORTERS

Advanced Research + Invention Agency ARIA

UKRI Biotechnology and Biological Sciences Research Council

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erc European Research Council

UKRI Natural Environment Research Council

2BLADES 20 YEARS OF CROP INNOVATION

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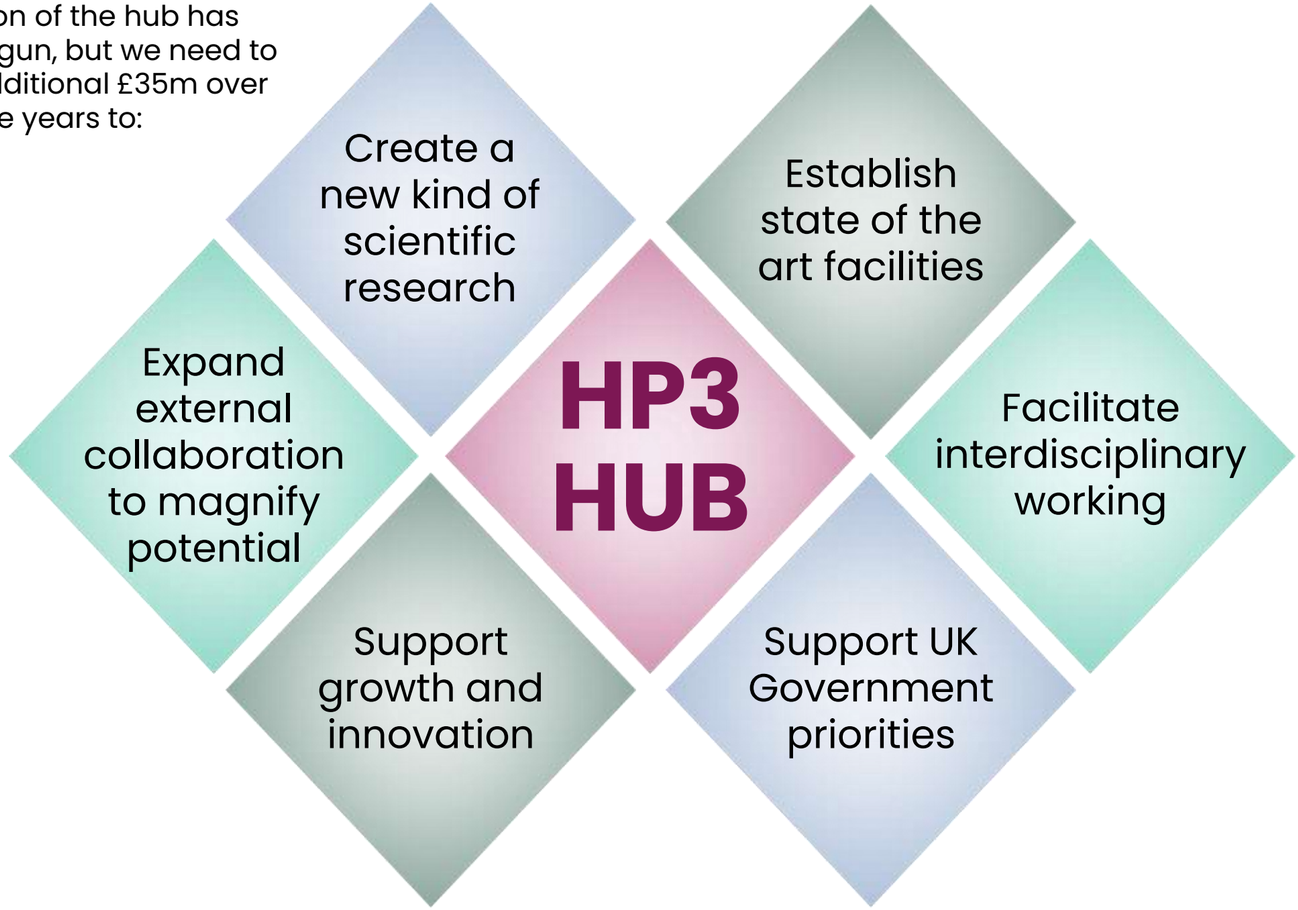
THE ROYAL SOCIETY

FULLY REALISING
THE HP3 VISION

Your philanthropic investment can help us maximise our public/private partnership to harness the power of plants and microbes to meet the world's most critical challenges.

Construction of the hub has already begun, but we need to raise an additional £35m over the next five years to:



BE PART OF THE **SOLUTION**

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Plant Health Discovery for a Sustainable Future

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Unlocking Nature's Diversity

Please join us.

If you would like to learn more about partnership opportunities, please contact our Director of Development, Angela Bowen

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