

## Results of competition: Agri-Tech Catalyst - Industrial research awards - round 2

Total available funding for this competition was £12m from Innovate UK/Department of Business, Innovation and Skills, the Biotechnology and Biological Sciences Research Council and the Department for International Development.

**Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.**

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| <b>Agroceutical Products (lead)</b><br>Aberystwyth University<br>Harper Adams University  | Yellow Gold: Innovative systems for sustainable daffodil-derived galanthamine production in the uplands. | £1,339,791             | £1,071,682             |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| <p>Galantamine is a pharmaceutical product that had been an approved Alzheimer's Disease treatment since 1998. Galantamine can be synthesised chemically but it is a difficult and expensive process. Producing galantamine from galanthamine extracted from plants is more cost effective, but supplies are limited. Daffodils are an economically feasible plant source for cultivation in the UK, and growing daffodils in upland areas triggers a 50% higher yield of galanthamine.</p> <p>This proposal will deliver a new approach for producing galanthamine based on integrating daffodil growing into existing upland pasture. This will increase the economic sustainability of hill farming by providing farmers with a high value crop while maintaining traditional farming systems in the upland areas. The project will develop the required machinery, quantify the yield of galanthamine achievable, and assess the impact on sheep performance of incorporating daffodil production into grazed pastures.</p> |  |                        |                        |

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| <b>Arch UK Biocides Limited (lead)</b><br>I2LRESEARCH LTD<br>Food and Environment Research Agency (FERA)<br>University Of Durham   | Next generation biopesticides for environmentally benign control of crop pests | £953,452               | £677,400               |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>The aim of this project is to translate innovative research into commercial products for the control of UK and European crop pests. The academic partners have developed a platform (fusion protein technology) that converts naturally occurring spider venom peptides into orally effective pesticides.</p> <p>Venom peptides, known to be harmless to mammals, are linked to a 'carrier' protein, when the resultant fusion protein is ingested by invertebrates the carrier protein transports the attached spider toxin across the gut and into the circulatory system where it can access its target site of action in the central nervous system.</p> <p>The project will produce fusion proteins on a commercial scale by fermentation of genetically engineered yeast. This approach can be used to generate a new class of environmentally friendly pesticides that are harmless to non-target organisms such as bees. Our initial programme will develop formulations targeting slugs and beetle pests of wheat and oil seed rape.</p> |  |                        |                        |

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| <b>Berry Gardens Growers Ltd (lead)</b><br>Delta-T Devices Limited<br>Eden Irrigation Consultancy Ltd<br>East Malling Research<br>Weatherquest Ltd   | Developing a decision support system to improve crop management, yield forecasting and resource use efficiency in UK soft fruit production | £772,109               | £556,425               |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>The UK soft fruit industry has invested heavily in new technologies and marketable yields have increased 3-fold in recent years, but further increases are possible if crop agronomy is optimised. However, 33% of all harvested fruit is wasted each year, due to disorders such as rots, bruising and a poor shelf-life that are exacerbated in changeable weather.</p> <p>A 30% reduction in soft fruit waste would stem UK imports and generate extra income for growers. To achieve this, we will develop a Decision Support System that will enable growers to improve decision making and reduce the impact of changeable weather on crop yield and quality.</p> <p>Growers, retailers and consumers will benefit from more accurate yield forecasts leading to better pricing, greater resource use efficiency leading to cost savings and improved environmental performance, lower waste during production leading to increased tonnage to sell, improved consistency of supply of high quality fresh fruit with an assured shelf-life leading to reduced wastage in store.</p> |  |                        |                        |

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| <b>Dunbia (Wales) (lead)</b><br>Gildea Photonics Limited<br>Sainsbury's Supermarkets Limited  | Imaging systems and the development of a new lamb carcass grading system | £891,187               | £470,573               |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| <p>The current proposal aims to develop a new system for assessment of lamb carcasses that will objectively and more accurately quantify carcass classification and composition. Furthermore, the project aims to develop an alternative pricing model that more closely reflects the retail value of lamb. This system will be based on Imaging technology and will facilitate a more targeted approach to lamb production and has the potential to drive new breeding strategies to deliver carcasses that more accurately meet retailer specification and consumer demand.</p> |  |                        |                        |

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| <p><b>Lucozade Ribena Suntory Limited (lead)</b><br/>           ABB Marketing Limited<br/>           Agrovista UK Limited<br/>           AHDB Potato Council<br/>           East Malling Research<br/>           Michael H Keene &amp; Son Limited<br/>           Pixley Berries (Juice) Limited<br/>           The Asplins Producer Organisation Limited<br/>           The James Hutton Institute<br/>           Yara UK Limited</p>   | <p>Winter chilling in blackcurrants: adapting to climate change, through new technologies for improved dormancy release</p> | <p>£890,055</p>        | <p>£681,694</p>        |
| <p><b>Project description - provided by applicants</b></p>   |   |                        |                        |
| <p>This project addresses the effects of climate change in the UK on blackcurrant production, where the trend towards warmer winters has adversely affected dormancy break and subsequent crop yields and quality, substantially reducing profitability. The use of existing dormancy-breaking treatments, developed for other perennial crops, will be assessed for their efficacy in blackcurrant, their use optimised, and their mode of action evaluated. Best practice guidelines for growers will be developed. Additionally, models predicting responses to the chilling environment for different varieties will be established, and this information will be used to direct the use of dormancy-breaking treatments to improve yield and quality.</p> |   |                        |                        |

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| <b>M &amp; W Mack Limited (lead)</b><br>East Malling Research<br>East Malling Services Limited<br>Fruit Advisory Services Team LLP<br>Norton Folgate Marketing Ltd<br>Sainsburys Limited<br>Total Worldfresh Limited   | Sustainable Intensification of UK plum production. | £1,395,956             | £1,081,373             |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>The food retail industry is experiencing increasing demand from consumers for UK grown fresh produce and would like to substitute imports with home produce. The demand for home grown plums cannot currently be met due to unreliable and inefficient cropping systems. This collaborative project will develop integrated new technologies that will address the major existing production problems and limitations for fresh plums. The sustainable intensification of this horticultural crop will be achieved through integration of a high-density growing system with new rootstocks, varieties and manipulation of tree architecture for increased yield, coupled with protected cropping regimes and component technologies that will regulate crop load, fruit ripening and give significant season extension. This intensive and profitable growing system will enable UK growers to confidently invest in plum production, delivering substantial economic impact (&gt;£10 m/yr) to the UK horticulture industry.</p> |  |                        |                        |

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| <b>Mylnfield Research Services (lead)</b><br>AHDB<br>Castleton Fruit Ltd<br>Delta T<br>James Hutton Institute<br>M&S plc<br>S&A Group Holdings Ltd<br>SoilEssentials<br>Thomas Thomson Ltd   | Improving yield stability in UK<br>blueberry production | £1,494,755             | £941,615               |
| <b>Project description - provided by applicants</b>  |   |                        |                        |
| <p>Yield instability negatively impacts UK soft fruit growers, preventing accurate profit prediction and maximisation, causing volatility of UK supply. The problem is now well recognised within industry, though the causes of significant season to season yield variation are unknown. This proposal aims to identify the physiological and biochemical processes underlying yield limitations, thereby identifying causes of the yield volatility phenotype. An examination of the impact of growing environment and management practices on yield will be undertaken to allow development of predictive yield maps &amp; models that provide frameworks for yield optimisation in the short to medium term.</p> <p>This knowledge of available tools to assist management will be transferred to growers and also used to develop molecular markers for yield stability allowing long-term solutions to the problem, thereby future proofing the UK soft fruit industry, particularly blueberry crops with application to other fruit crops.</p> |   |                        |                        |

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| <p><b>North Bank Growers Limited (lead)</b><br/>Adas UK Limited<br/>Finlay Flowers UK Limited<br/>May Barn Horticultural Consultancy Limited<br/>Nutricycle Limited<br/>Suncrop Produce Limited<br/>Stubbins Limited<br/>University of Nottingham<br/>Waitrose Limited<br/>Wight Salads Group Limited</p>   | <p>Targeted supply chain ethylene removal to control the development of fresh produce</p> | <p>£2,258,468</p>      | <p>£1,126,715</p>      |
| <p><b>Project description - provided by applicants</b></p>  |   |                        |                        |
| <p>Fresh tomatoes and peppers are high value crops and are an important part of a healthy human diet. These products are highly perishable and are subject to peaks and troughs in production. Low temperatures are currently used to extend shelf life, but the shelf life is short and energy costs are high. As a result, the supply chain for such products remains unacceptable wasteful.</p> <p>A plant hormone, ethylene, is key to the ripening process, the production of which can be minimised by the use of chemicals. Chemical application however remains a barrier to consumer acceptance; the project will develop the use of an innovative non-chemical non-contact technique which safely removes ethylene from the air around fresh produce. Commercial scale trials and laboratory investigations will be conducted to establish when and how to safely suspend ripening within the supply chain to deliver safe, high quality nutritious fresh UK produced food to the consumer.</p> |   |                        |                        |



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| <b>PepsiCo International Limited (lead)</b><br>Cranfield University   | Implementing novel, cost effective alternatives to CIPC for sustainable potato storage | £1,137,252             | £833,530               |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| <p>Long-term storage of potato tubers is essential for year round supply. Maintaining sprout suppression and low reducing sugars during storage of processing potatoes is paramount for supply quality and minimising the formation of acrylamide; key priorities for the processing industry.</p> <p>Potato storage is still heavily reliant on the chemical chlorpropham (CIPC) to manage sprouting but further restrictions are coming into force. The proposed work will build upon recent research and develop novel, cost effective, benign, physiologically-targeted storage interventions which will suppress sprouting and maintain low sugars. This offers a route to incremental reduction in and ultimately the elimination of CIPC within the UK and beyond.</p> |  |                        |                        |

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| <b>PepsiCo International Limited (lead)</b><br>Aberystwyth University<br>James Hutton Institute<br>Mylnefield Research Services Limited<br>NIAB<br>URSULA Agriculture Limited  | Optimising oat yield and quality to deliver sustainable production and economic impact (Opti-Oat) | £1,872,072             | £1,313,802             |
| <b>Project description - provided by applicants</b>  |   |                        |                        |
| <p>This project will provide UK oat producers with world leading agronomic ‘tools’ to maximise grower returns and capitalise on the increasing demand for food grade oats. The objectives are</p> <ol style="list-style-type: none"> <li>1) Develop and validate algorithms for translating visual / spectral sensor data from Unmanned Aircraft Systems (UAS) into quantifiable crop parameters to enable growers to optimise management for yield and quality across fields;</li> <li>2) develop an Oat Crop Model and associated decision support tools;</li> <li>3) develop an Oat Growth Guide which will provide a reference to assess crops status against key development bench-marks.</li> </ol> <p>Focused dissemination of these innovative tools will increase average yields by at least 1t/ha (equivalent to a ~£15M uplift p.a. in output from the existing oat land base), contribute to sustainable intensification, reduce supply risk for millers, reduce imports, catalyse product innovation &amp; consumer access to healthy grains and stimulate milled product export.</p> |   |                        |                        |

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| <b>Silent Herdsman Ltd (lead)</b><br>Gilden Photonics Ltd<br>Harbro Ltd<br>Richard Keenan and Company<br>SRUC<br>University of Strathclyde<br>Wm Morrisons Supermarkets PLC   | PrecisionBeef | £1,346,685             | £1,001,282             |
| <b>Project description - provided by applicants</b>   |               |                        |                        |
| <p>The goals of the project are:</p> <p>(i) to develop animal-mounted sensor systems that capture beef cattle feeding behaviour patterns and integrate this information with a feeding system that accurately estimates feed intake at the individual animal level and</p> <p>(ii) to develop techniques for monitoring, in a commercial environment, the performance efficiency of individual animals. The aim is to integrate both input (feed) and output (growth/yield) measurements at the individual animal level, allowing beef farmers to make appropriate management decisions to improve the overall efficiency of beef production.</p> <p>The decision support platform will inform the livestock producer of the correct and balanced amounts of nutrients to be administered to individual beef animals in order to maximise production and profitability.</p> |               |                        |                        |

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| <b>Soilessential Limited (lead)</b><br>GRIMME (U.K.) Limited<br>McCain Food (GB) Limited<br>Newcastle University<br>The James Hutton Institute  | TuberZone – Development of an innovative spatial crop model and decision support system for improved potato agronomy | £1,099,919             | £690,320               |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| <p>The potato industry has witnessed a 10-year long yield stagnation; coupled with increasingly stringent demands on potato quality, there is a compelling need for farmers to increase marketable yield.</p> <p>This project aims to develop an innovative spatial crop model &amp; integrated decision support system for improved variable rate seed planting, fertiliser use &amp; irrigation scheduling to increase productivity of the potato value chain. Converging the multi-disciplinary expertise of Soil Essentials (SE), Newcastle University (NU), Mylnefield Research Services (MRS), Grimme (GR), &amp; McCain (MC), we will build upon the MAPP point model (Management Advisory Package for Potatoes) by taking a holistic approach &amp; considering the spatial variability of tuber size distribution to inform a new &amp; improved adaptive spatial meta-model.</p> <p>The resulting spatial decision support system is cross-sectorial &amp; has the potential to transform in-field decision-making, not just for potato farming but also for other root &amp; arable crops.</p> |  |                        |                        |

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| Yorkshire Dairy Goats (lead)<br>SRUC   | Exploitation of genomic technologies for sustainable intensification of dairy goats | £823,657               | £599,831               |
| <b>Project description - provided by applicants</b>  |   |                        |                        |
| <p>This project addresses key challenges facing the sustainable intensification of dairy goat milk production by using new genetic and genomic technologies to improve the efficiency of milk production and continuity of supply.</p> <p>This project will identify sires with daughters that readily breed out of season and generate genomic predictions of merit for this trait. The exploitation of such ability by the wider commercial goat industry in the UK and abroad will be enabled via genomic predictions for this and a range of other key traits via the development of a low density (LD), lower cost customised single nucleotide polymorphism (SNP) array for UK goats. This allows the imputation from LD to the higher density SNP arrays and a greater proportion of the outer herd nucleus to be genotyped, thereby creating greater uptake and impact to a the wider UK goat population and beyond.</p> |   |                        |                        |