# Horticulture and Potato Initiative Consortia-Building Workshop

**Summary of topics identified during the workshop breakout sessions**

| | | Author | Institute | Notes/ Area of concern/ Project focus |
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| **Research Challenge** | **Changing Seasons** | | | |
| **Sub- theme** | Remote sensing and associated technologies | | | Use of remote sensing to detect (and predict) the impact of change on crops |
| | | | | Use of thermal image sensors to map and monitor water stress on farm wide level |
| **Sub- theme** | Phenology | Colin Turnbull | Imperial College London | Cross-industry tools for flowering time and seasonality control under changing climates |
| | | Judith Irwin | JIC | Climate change and crop phenology |
| | | Christopher Atkinson | East Malling Research | Perennial crops and chilling |
| | | Russ Sharp | Moulton Collage | Novel crops for emerging food markets and changing climates |
| | | Jack de Wit | Rijk Zwaan Zaadteelt en Zaadhandel B.V. | "Climate-proof" Robust varieties |
| | | Jack de Wit | Rijk Zwaan Zaadteelt en Zaadhandel B.V. | Broad Resistance to biotic and abiotic stress |
| | | Roel Veenstra | Bejo Zaden B.V. | Breeding varieties with good general performance under (a)biotic stress conditions |
| **Sub- theme** | Pathogen/Pest dynamics | Daan Kiezebrink | Scottish Agricultural College (SAC) | Shift to possibly warmer winters, pest problems and potential control agents |
| | | Daan Kiezebrink | Scottish Agricultural College (SAC) | Shift in rainfall patterns, effect on pathogens - review of management practices |
| | | Anthony Bambridge | Potato Council | Predicting change in pathogens from climate change and developing mitigation strategies |
| **Sub- theme** | Environmental services and forecasting | Paul Hadley | Uni Reading | Scheduling/ predicting crop maturity |
| | | | | Identification and forecasting systems for flowering (maturity)- vegetable crops as support for marketing functions |
| **Sub- theme** | Modelling | Tiina Roose | University of Southampton | Modelling plant P,N and K uptake |
| | | Tiina Roose | University of Southampton | Modelling plant water uptake |
| | | Tiina Roose | University of Southampton | Imaging plant root growth in soil using X-ray CT |
| **Sub- theme** | Seasonal consumption and production and VV | Kirsten Brandt | Newcastle University, School of Agriculture, Food | Consumer preferences and perceptions- interaction with marketing strategies |
| | | Wendy Seel | Organic Growers Alliance | Improved Varieties for dry springs and cool summers |
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| **Research Challenge** | **Crop Maturity and Spoilage** | | | |
| | | Theresa Huxley | Sainsburys | Optimum harvest time for product destined to be stored e.g. UK Cherry |
| | | Theresa Huxley | Sainsburys | Water management to improve shelf life |
| | | Theresa Huxley | Sainsburys | Optimum time for pears (to give maximum |
| | | Theresa Huxley | Sainsburys | Control of rots in stored fruit |
| | | Theresa Huxley | Sainsburys | Destructive sugar acid ratio |
| | | Cathie Martin | JIC | eating quality |
| | | Sue Kennedy | Elsoms Seeds Ltd | Effect s of climate change on crop scheduling |
| | | Graham Seymour | University of Nottingham | Quality, Health benefits |
| | | | | Energy reduction in cold storage systems by choice of time of day for initial storage to get down to temps. |
| | | Phillip Effingham | Greentech Consultancy Ltd | Measurement of "crop maturity" as a control mechanism for improving shelf life - particularly in broccoli but also applicable to wider range |
| | | Hilary Rogers | Cardiff University | How Pre-harvest conditions affect post harvest spoilage |
| | | Susan Feuerhelm | Bakkavor Foods Ltd | Effect of seasonal variations in growing conditions on processing quality |
| | | Susan Feuerhelm | Bakkavor Foods Ltd | Biosensors for optimum maturity |
| | | Richard Colgan | Natural Resources Institute | Pre-harvest factors impacting on post-harvest quality |
| | | Jonathan Webber | Callen - Lenz Associates Limited | Use of high resolution - timely remote sensing to inform growers on yield prediction |
| | | Paul Hadley | University of Reading | Scheduling/ predicting crop maturity |
| | | Adrian Cunnington | Potato Council | Senescent sweetening in storage of potato |
| | | Paul Fraser | Royal Holloway University of London | Improved shelf-life - delaying ripening without impacting on quality |
| | | Carol Wagstaff | University of Reading | Supply chain resilience nutritional/ flavour quality sensory analysis |
| | | Kirsten Brandt | Newcastle University, School of Agriculture, Food | Consumer storage/use and waste/shelf life post sale |
| | | Wendy Seel | Organic Growers Alliance | Predicting crop maturity in relation to soil and climate conditions |
| | | | | Non-invasive techniques for quality and early disease detection |
| | | Nick Kruger | University of Oxford | Starch/sugar inter-conversion during low temperature storage |
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| **Research Challenge** | **Resource use efficiency** | | | |
| **Sub- theme** | Nitrogen and Phosphorus | Russ Sharp | Moulton collage | "Phyllosphere manipulation" Bacteria to keep leafy crops green |

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| | | | | Input costs increasing need to use N and P more efficiently and reduce pollution by lowering inputs or increasing uptake |
| | | | | Genetics of P - P acquisition and P utilisation |
| | | | | Phosphate - Microbes interaction with Phosphate, Regulator of P deficiency, Fungicide |
| | | Ingo Hein | JHI | Optimise the whole system - Nutrient and water efficiency. Identify the most beneficial system. |
| | | | | Cadmium in fertilisers - select genotypes, Altered selectivity -Zn Kd |
| | | | | Herbicide for nettles |
| | | | | Nitrogen and drought water use |
| | | Kirsten Brandt | Newcastle University, School of Agriculture, Food | Yield Vs. Quality - Effects on taste/consumer perception |
| | | | | Mine the 7 inorganic P- plant soil exudates, other amendments, AM |
| | | | | Organic Manures |
| | | | | AM- Plant associations to acquire P |
| | | | | Links with plant disease |
| | | | | Mine the soil organic P. - Microbes, AM, GM (phytesen) |
| | | Tiina Roose | University of Southampton | Use models to inform Nitrogen usage efficiency |
| | | Tiina Roose | University of Southampton | Modelling P uptake by roots |
| | | Tiina Roose | University of Southampton | Modelling N uptake by roots |
| | | Philip Morley | British Tomato Growers Association | Mycorrizae and P nutrition ->optimisation of soil health and nutrient availability |
| | | Philip Morley | British Tomato Growers Association | "Rhizosphere manipulation" Helper bacteria/ mycorrhiza/ optimise root architecture |
| | | | | Imaging plant roots from seed to crop using X-ray CT - Imaging using remote sensing for N indicators e.g. Growth |
| **Sub- theme** | Energy | | | Maximising Transpiration 'Naturally' |
| | | | | Photosynthetic efficiency %, CO2 sources and efficiency of use- systems +plants |
| | | | | Kwh per unit yield rather than m2 (modelling Vertical) |
| | | | | Energy Conservation with protected environments (heat sinks + cold dumps) |
| | | | | Temperature tolerance High + Low |
| | | | | Light use efficiency (LEDs) maximise output per light unit input |
| | | | | Energy re-use in potato stores |
| | | | | Reducing Energy for entry into cold store for fruit by choice of time of day (IE Getting down to storage temps) |
| | | | | Energy in growing systems (low input) |
| | | | | Urban production to reduce inputs in supply chain |
| | | | | Waste energy ( heat, gas to power and anaerobic digestion) |
| | | | | Greenhouse design and performance |
| | | | | Climate interaction with glasshouse energy use |
| | | | | Proof of concept - zero carbon greenhouse, potato storage |
| **Sub- theme** | Water | | | Limited resource, recycled resource, Linked to all other resource indicator - N, P + Energy |
| | | | | Impacted on by climate change |
| | | | | Critical issue production plant health |
| | | | | Water control of plant growth and development |
| | | | | Breeding for water use efficiency |
| | | | | Cropping patterns, different crops |
| | | | | Water availability link to crop quality |
| | | Susan Feuerhelm | Bakkavor Foods Ltd | Water footprints imports (global food sourcing) - Fitness for purpose i.e. microbiological risk management |
| | | | | Regional issue East/West Environmental impact biodiversity |
| | | Tiina Roose | University of Southampton | Modelling plant water uptake |
| | | Tiina Roose | University of Southampton | Imaging plant water uptake using X-ray CT |
| | | | | Efficacy of pesticide use - relates to pest and disease control |
| | | | | Understand resistance mechanism in potatoes to common scab and use this for better water efficiency in potato production |
| | | | | Flooding in winter |
| | | | | Energy consumption in water moving (pumping) |
| | | | | Efficiency of application |
| | | | | Scheduling methods, Technological solutions, Sensors/ measuring soil availability |
| | | | | Closed systems |
| | | | | Mechanical properties of soil |

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| | | | | Rooting systems and Water use efficiency |
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| **Research Challenge** | **Pests and Pathogens** | | | |
| | | Wendy Seel | Organic Growers Alliance | Impact of cultivation on inherent biological control capacity of the soil against pests and diseases |
| | | Jeff Peters | FERA | Molecular diagnostics + risk prediction |
| | | Jeff Peters | FERA | Climate change affecting pathogen virulence |
| | | Richard Harington | Rothamsted | Impacts of high summer temperature on virus vector behaviours (flight, probing etc.) |
| | | Richard Harington | Rothamsted | Efficiency of virus acquisition/ inoculation |
| | | Richard Harington | Rothamsted | Pest/ natural enemy dynamics |
| | | Richard Harington | Rothamsted | Selection of different aphid clones/ virus strains |
| | | Richard Harington | Rothamsted | Phenological interactions between crop/ pests |
| | | Richard Harington | Rothamsted | Insecticide resistance |
| | | Wendy Seel | Organic Growers Alliance | Use of intercropping and companion planting to influence soil provision of bio control |
| | | Wendy Seel | Organic Growers Alliance | What happens when resistances are combined? How will resistance be affected by climate change? |
| | | Sue Hartley | University of York | Biopecticides from co-crops (e.g. soil fumigants from brassicas vs. soil pests/pathogens |
| | | David Loughlin | Sentomol Ltd | Suppression of insect pests on soft fruit or field vegetables through mass trapping or population suppression with semiochemicals |
| | | Daryl Shailes | H.L. Hutchinsons Ltd | Understanding changing pest and disease problems in UK |
| | | | | FLNs in the rotation - Wireworm |
| | | Barrie Fionedine | Agrii | Bio fumigation for PCN, FLN, Wireworm management |
| | | John Clarkson | University of Warwick | Bio fumigation for control of soil borne diseases |
| | | Nick Batty | University of Reading | New ways to control cabbage root fly and other brassica pests |
| | | Sue Hartley | University of York | Using beneficial microbes ( e.g. Mycorhiza) to improve pest resistance |
| | | Murray Grant | University of Exeter | Exploitation of beneficial organisms for crop protection, tolerance to abiotic stress |
| | | Paul Sopp | Fargro Ltd. | Interaction between pesticides and the plant - Non-pathogenic microbial and plant defence mechanisms |
| | | | | PCN Integrated control, biochemical agents, population management |
| | | Philip Morley | British Tomato Growers Association | Biological control of soil pathogens |
| | | Rosemary Collier | University of Warwick | Combining Pesticide and bio pesticide treatments |
| | | Sue Hartley | University of York | Timely remote sensing for emergence, pre-emergence+ post intervention mapping and monitoring |
| | | Philip Morley | British Tomato Growers Association | Keep it real, useful to growers and applied (to tomato crops) |
| | | Philip Morley | British Tomato Growers Association | Re-balance soil ecosystems to optimise root and plant health |
| | | Rosemary Coller | Warwick | Pest and disease resistance in vegetables |
| | | Daniel Walker | University of Glasgow | GM crops expressing species specific protein antibiotics- potatoes resistance to Phytophthora |
| | | Roel Veenstra | Bejo Zaden B.V. | Disease resistance genes and markers in vegetable crops |
| | | Murray Grant | University of Exeter | Using cryptic gene expression activated by microbial interaction to identify novel bioprotectants |
| | | Jean Fitzgerald | East Malling research | Plant- pest- virus- predator interactions |
| | | | | Potato cyst nematodes - Novel approaches to control? |
| | | Johnathan Webber | Callen - Lenz Associates Limited | Ultra low volume airborne spraying - Uses in countering pest and disease |
| | | Pat Croft | Stockbridge Technology Centre | LED use in insect trapping |
| | | Daryl Shailes | H.L. Hutchinsons Ltd | Use of bio fumigation - benefits and pitfalls |
| | | Neil Morrision | Oxitec Ltd | Insect Biotechnology for genetic control of pests |
| | | | | Genetics of breeding potato: late blight, PCN, Viruses e.g. PVY |
| | | David Shaw / Simon White | Sarvari Research Trust | Mapping and identification of LB resistance genes in conventional bred material |
| | | Barrie Fionedine | Agrii | Developing a rapid PCR basis for Alternaria ID - Lateral flow device |
| | | | | Better Gene marker technology for better efficiency in pest and disease breeding |
| | | | | Resistance to PCN - exploiting markers |
| | | Milika Buurman | Limagrain UK Ltd | Genetic basis of virus (seed borne) (vining peas) |
| | | Rebecca Ward | Processors and Growers Research organisation | Genetic basis for root disease resistance in Downey mildew resistance in Peas (+virus') |
| | | Dave Pink | Harper Adams University College | Genetic basis of durable resistance |
| | | | | Genetic mapping + characteristics disease resistance using NES approaches |
| | | | | Tool kit development for pathogen identification and resistance breeding |
| | | | | Molecular diagnosis of variation in Alternaria |
| | | Kate Parsley | NIAB | Pea and Bean Genetic Resources for disease resistance |

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| | | Ingo Hein | JHI | Potato resistance - late blight, R gene cloning, systems approach, metabolomic and transcriptome |
| | | Sue Hartley | University of York | Resistance against simultaneous attack by above-ground and below ground pests (e.g. Aphids - nematodes, aphids - vine weevil |
| | | Johnathan Jones | Sainsbury Lab | Disease resistance - potato late blight, downy mildew and Albugo |
| | | David Shaw / Simon White | Sarvari Research Trust | Potato Late Blight resistance |
| | | Andy Cureton | BBSRC | Pre-harvest conditions effect shelf life and storage |
| | | Andy Cureton | BBSRC | Pre-harvest water/ seasonal variation |
| | | Andy Cureton | BBSRC | Technology to measure maturity - non invasive |
| | | Andy Cureton | BBSRC | Modelling/ Yield modification - supply chain mobilisation |
| | | Andy Cureton | BBSRC | Supply chain resilience/ storage - delay ripening, control rot. Energy reduction |
| | | Andy Cureton | BBSRC | Starch to sugar relationship - storage |
| | | Andy Cureton | BBSRC | Natural products for quality and health |
| | | William Symomdson | Cardiff Uni | Develop Molecular Markers to track spread (needs DNA to Identify) - Slugs and Aphids devastating horticulture in N. Europe, attacks almost all crops |
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| **Research Challenge** | **Seed Quality and Vigour** | | | |
| | General comments from Facilitator: Steve Tones | Steve Tones | HDC | The quality and vigour of seeds and seedlings, and their uniformity, underpins the productivity and resilience of all seed-grown horticultural crops. |
| | | Steve Tones | HDC | Better understanding is needed of the ways in which seed and seedling quality and vigour are determined, both genetically and environmentally, so that we can maximise the potential output and efficiency of horticultural crop production and minimise associated waste. |
| | | Steve Tones | HDC | Greater use of precision crop management tools is likely to be necessary if we are to fully capitalise on the potential for such improvement in practice. |
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| **Sub- theme** | Seed production & set | | | Parent plant genetics determining pollen quality, seed production, seed set and seed quality |
| | | | | Agronomic and environmental influences through parent plants on pollen quality, seed production, seed set and seed quality |
| | | | | Improving pollen quality, seed production, seed set and seed quality through management of parent plants |
| | | | | Gene sequencing/trait mapping/genetic marking |
| | | | | Genetically certified seed |
| **Sub- theme** | Seed germination | | | Genetic & molecular basis of seed dormancy |
| | | | | Utilisation of seed storage reserves |
| | | | | Enzyme activation |
| | | | | Exploiting protein modification |
| | | | | Direct influence of agronomic and environmental factors on seed germination |
| | | | | Improving the speed and uniformity of seed germination (including chemical treatment/priming/coating of seeds) |
| | | | | Gene sequencing/trait mapping/genetic marking |
| **Sub- theme** | Seed-specific diseases | | | Disease identification and diagnostics |
| | | | | Genetic and molecular basis of seed defence responses to disease invasion |
| | | | | Enhancement of seed defence responses to disease invasion |
| | | | | Seed disease treatments |
| | | | | Gene sequencing/trait mapping/genetic marking |
| **Sub- theme** | Seedling vigour | | | Genetic and molecular basis of seedling vigour |
| | | | | Direct influence of agronomic and environmental stress factors on seedling vigour |
| | | | | Gene sequencing/trait mapping/genetic marking |