

United Kingdom

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Please describe any new experimental resources and/or software tools available to Arabidopsis researchers that have been initiated or funded in your country in 2020 or early 2021

- New fluorescent auxin probes visualize tissue-specific and subcellular distributions of auxin in Arabidopsis <https://nph.onlinelibrary.wiley.com/doi/10.1111/nph.17183>
- 1,135 Ionomes reveals the global pattern of leaf and seed mineral nutrient and trace element diversity in *Arabidopsis thaliana* <https://onlinelibrary.wiley.com/doi/10.1111/tpj.15177> <https://ffionexplorer.nottingham.ac.uk/ionmap/>
- KnetMiner: a comprehensive approach for supporting evidence-based gene discovery and complex trait analysis across species. <https://onlinelibrary.wiley.com/doi/10.1111/pbi.13583>
- 3D RNA-seq: a powerful and flexible tool for rapid and accurate differential expression and alternative splicing analysis of RNA-seq data. <https://www.tandfonline.com/doi/full/10.1080/15476286.2020.1858253>
- Arabidopsis antibody resources for functional studies in plants <https://www.nature.com/articles/s41598-020-78689-1>
- Computational tools for serial block electron microscopy reveal plasmodesmata distributions and wall environments <http://www.plantphysiol.org/content/early/2020/07/23/pp.20.00396.longhttp://mib.helsinki.fi/downloads.html>

Please provide a paragraph describing the general impact of the COVID19 pandemic on the scientific community in your country

The impact of COVID19 on the UK scientific community varied depending the type of institution in which the research is conducted. Many university research labs were closed from March-October 2020 whilst labs in many Research Institutes were often able to return to work soon after the first lockdown ended in May 2020. As such this may have a significant effect in research productivity over the coming years. On the return to labs researchers have needed to limit numbers and observe social distancing. This has required additional planning but should not greatly impact productivity.

The majority of UK research funding comes from UKRI research councils. UKRI is distributing funding of up to £180 million to support research and technical staff whose projects have been disrupted. Universities and organisations will receive COVID-19 allocations and will be able to provide the majority of funded projects with an extension in funding.

UK PhD students take between 3-4 years to complete their studies and UKRI-funding for students in their final year of study was extended by 6 months. Other PhD students were able to apply for a three-month extension on a case-by-case basis. The UK is slowly opening up in May 2021 although social distancing will remain until into the summer and beyond.

University researchers expect difficulty in travelling overseas during the majority of 2021 so will likely be limited to virtual or UK based meetings until 2022. We very much hope to welcome the international community to the UK next year for ICAR2022 in Belfast.

Planned events for 2021 and 2022

- The #UKPlantSciPresents webinar series has had 20+ events since May2020 and will continue in September 2021. These events provide a forum for (mostly) UK-based Arabidopsis researchers to promote their research. Over the past year 3500+ delegates have attended these webinars. The recording of webinars can be viewed here: <http://blog.garnetcommunity.org.uk/ukplantscipresents-webinars>

- ICAR2022 will be held in Belfast between 20-24 June 2022 where we hope to bring together the Arabidopsis community for the first time since 2019 in Wuhan. Professor Dame Caroline Dean, Professor Keiko Torii and Professor Liam Dolan will provide keynote talks and we have scheduled six exciting plenary sessions. **Applications are now open to organise a two-hour concurrent session so we encourage the community to take advantage of this opportunity. All information can be found here:** <http://icar2022.arabidopsisresearch.org/>

32nd International Conference on Arabidopsis Research



ICAR2022: Belfast

icar2022.arabidopsisresearch.org

Selected Publications

- Pandey BK, Huang G, Bhosale R, Hartman S, Sturrock CJ, Jose L, Martin OC, Karady M, Voesenek LACJ, Ljung K, Lynch JP, Brown KM, Whalley WR, Mooney SJ, Zhang D, Bennett MJ (2021) Plant roots sense soil compaction through restricted ethylene diffusion. *Science*. doi: 10.1126/science.abf301

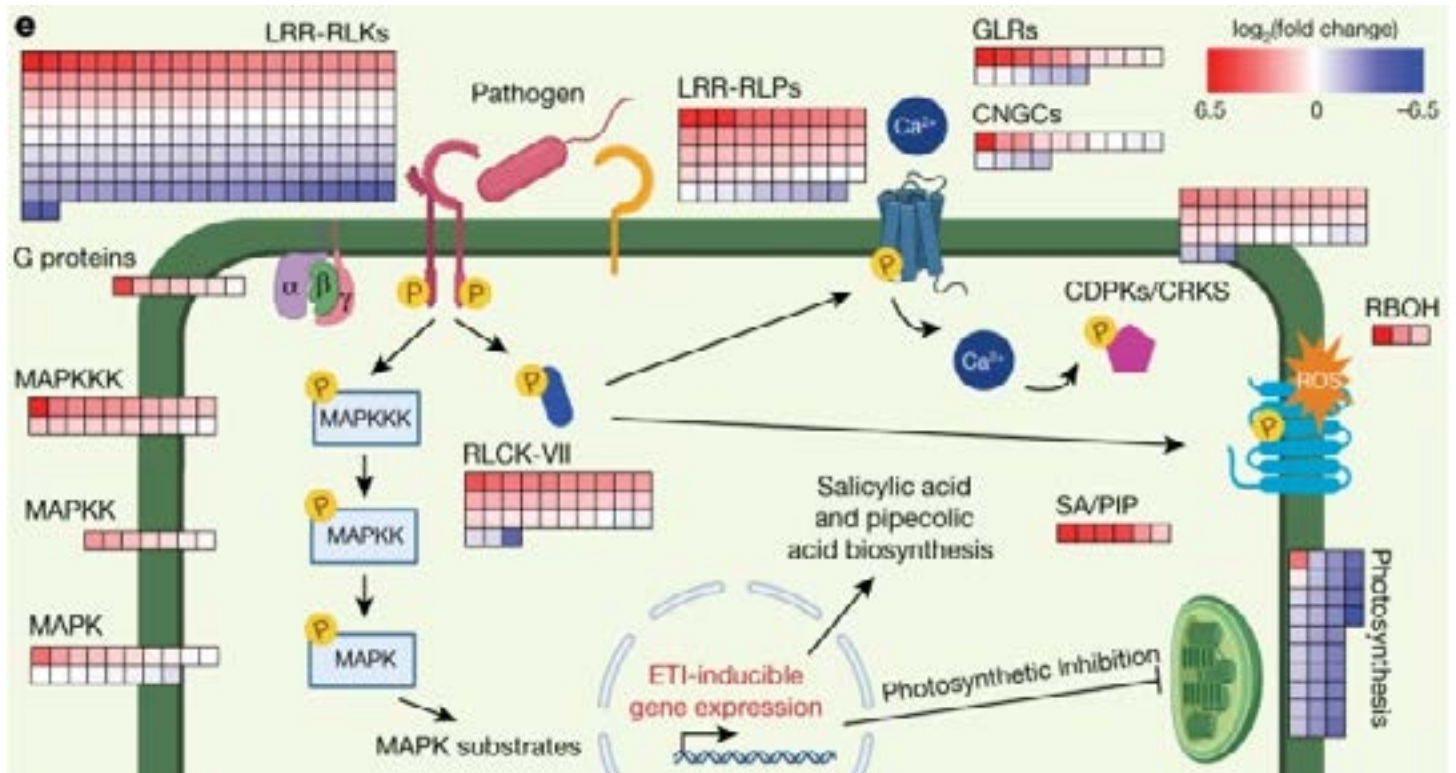
This manuscript uses a mix of molecular genetics and CT imaging to demonstrate that ethylene insensitive mutants are able to grow better through compacted soil than wildtype plants. This suggests a mechanism in which compacted soils prevents the diffusion of ethylene, thus inhibiting root growth.

- Yang W, Cortijo S, Korsbo N, Roszak P, Schiessl K, Gurzadyan A, Wightman R, Jönsson H, Meyerowitz E (2021) Molecular mechanism of cytokinin-activated cell division in Arabidopsis. *Science* doi: 10.1126/science.abe2305.

This research provides a more detailed explanation of the role of cytokinin in promoting cell proliferation. The authors show that in the Arabidopsis shoot apical meristem, cytokinin regulates cell division by promoting nuclear shuttling of the transcription factor Myb-domain protein 3R4 (MYB3R4) at the G2-to-M transition. An engineered nuclear-restricted MYB3R4 mimics the cytokinin effects of enhanced cell proliferation and meristem growth.

- Ngou BPM, Ahn HK, Ding P, Jones JDG (2021) Mutual potentiation of plant immunity by cell-surface and intracellular receptors. *Nature*. doi: 10.1038/s41586-021-03315-7.

This manuscript analyses interactions between the two distinct immune systems in Arabidopsis; cell-surface receptors and intracellular receptors. Activation of either immune system alone is insufficient to provide effective resistance against a bacterial pathogen. Thus, immune pathways activated by cell-surface and intracellular receptors in plants mutually potentiate to activate strong defences against pathogens.



RNA sequencing (RNA-seq) results showing the upregulation of PTI signalling pathway components during ETIAvrRps4.

Heat maps represent the expression level of PTI signalling pathway genes, salicylic acid (SA) and piperolic acid (PIP) biosynthesis pathway genes and photosynthetic pathway genes at 4 h after the induction of ETIAvrRps4. Red, upregulation; blue, downregulation. CDPKs, calcium-dependent protein kinases; CNGCs, cyclic nucleotide-gated channels; CRKs, cysteine-rich receptor-like kinases; GLRs, glutamate-like receptors; LRR-RLKs, leucine-rich-repeat receptor-like protein kinases; LRR-RLPs, leucine-rich repeat receptor-like proteins; RLCK-VII, receptor-like cytoplasmic kinase subfamily VII. All experiments were repeated at least three times with similar results. Data represent log₂-transformed fold changes in gene expression (normalized against expression of the corresponding genes before ETIAvrRps4 activation).

- Parry G, Benitez-Alfonso Y, Gibbs DJ, Grant M, Harper A, Harrison CJ, Kaiserli E, Leonelli S, May S, McKim S, Spoel S, Turnbull C, van der Hoorn RAL, Murray J (2021) How to build an effective research network: lessons from two decades of the GARNet plant science community. *J Exp Bot.* doi: 10.1093/jxb/eraa397.

For the past twenty years the GARNet network has supported the UK plant science community, with a particular focus on Arabidopsis. GARNet funding ended in 2020 and this manuscript provide a GARNet perspective on what it takes to develop an effective research network.

Major Funding Sources

- Biotechnology and Biological Sciences Research Council (BBSRC) <http://www.bbsrc.ac.uk/>
- The Gatsby Charitable Foundation <http://www.gatsby.org.uk/>
- European Research Council http://ec.europa.eu/research/era/index_en.htm
- Natural Environment Research Council <http://www.nerc.ac.uk>
- The Gates Foundation <http://www.gatesfoundation.org/>
- The Leverhulme Trust: <https://www.leverhulme.ac.uk/>
- The Newton Fund <https://www.newtonfund.ac.uk/>