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Daniel Leybourne

I am an agricultural entomologist and vector biologist with over ten years of active research experience.

My research goal is to increase sustainability in our agri-food systems through smarter and more sustainable management of insect pests and insect-vectored viruses.

I work collaboratively in an interdisciplinary manner, with partners across academia, industry, and the third-sector. This approach has supported a diverse research programme and the development of innovative pest and disease management systems.

2015 - 2019

PhD (Life Science)

The University of Dundee, UK.
Thesis title: Exploring molecular plant-aphid interactions for improved pest control under climate change.

2010 - 2013

BSc (Hons) Biology (Cell and Molecular Biology)

Newcastle University, UK

Fellow

- The Royal Entomological Society.

Associate Fellow

- Advance HE (2025).

Editor in Chief

- *Agricultural and Forest Entomology* (2026-present).

Associate Editor

- *Ecological Entomology* (2022-2026). Special Issue coordinator: Insect symbionts as mediators of ecological interactions (2026).
- *Agricultural and Forest Entomology* (2024-2026).

Committees

- Expert Working Group Member for insect pests: The Wheat Initiative (2026-present).
- Committee Member: The Insecticide Resistance Action Group-UK (2026-present).

November 2025 - Present

Principal Scientist and Research Lead in IPM

Agri-Food and Biosciences Institute, Belfast, UK.

In my current role as Principal Scientist I lead a scientific team at the Agri-Food and Biosciences Institute, the arms-length public sector research body of the Department of Agriculture, Environment, and Rural Affairs in Northern Ireland. Here, I lead a team of 16 scientific staff who deliver statutory scientific services on behalf of the Northern Irish Government.

I am also responsible for initiating and developing a research programme on plant health and integrated pest management. My research goal is to develop smart and sustainable methods for pest and insect-vectored virus management in agri-food systems.

December 2022 – December 2025

Research Fellow (1851 Royal Commission)

The University of Liverpool, Liverpool, UK.

This position was funded by an independent research fellowship awarded by The Royal Commission for the Exhibition of 1851. The research aim of my Fellowship was to identify factors that influence virus and vector success in agricultural ecosystems, and I secured additional funding from Innovate UK to develop smart tools for vector and disease management. The smart app developed during the Innovate UK project is available via *apple* and *google* stores. I also contributed towards academic teaching, student supervision (BSc, MBiolSci, PhD), and student assessment and achieved Associate Fellow status at Advance HE.

In this role I was proactive in developing research collaborations, and in 2024 I established the The Insect-Vectored Crop Virus Network – a network of experts working on crop vector and virus research across academia and industry. This network has led to several research outputs and fostered collaboration on sustainable vector and virus management.

January 2021 – December 2022

Research Fellow (Alexander von Humboldt)

Leibniz University Hannover, Hannover, Germany.

This position was funded by an independent research fellowship awarded by The Alexander von Humboldt Foundation. The research aim of my Fellowship was to highlight ecological links between landscape diversity and endosymbiont communities in important herbivorous insects. I supervised and assessed student projects (BSc and MSc) and secured additional funding from The British Ecological Society to support 16S and Illumina short-read sequencing.

September 2019 – December 2022

Entomologist

RSK ADAS Ltd., York, UK.

I primarily worked on arable crop protection where I was responsible for devising research ideas, developing and submitting funding applications, and delivering funded projects. I was inolved in project consortia that secured funding from Innovate UK, BBSRC, and the Agriculture and Horticultre Development Board. I was also responsible for managing and delivering contract research for commercial clients (including BASF, Corteva, Syngenta) and for disseminating research findings to academic, industry, and third-sector audiences.

Select Publications

I have authored over 25 academic publications, including 16 first-author and 4 last-author publications. Select publications are listed below. *Google Scholar H-index: 15.*

- **Leybourne DJ,** Zytynska SE, Martin EA. 2026. Top-down and bottom-up landscape processes influence the formation of microbial partnerships in herbivorous insects. *bioRxiv.*
- Preedy KF ….. **Leybourne DJ.** 2026. A modelling framework to estimate vector dispersal and disease spread in an important agricultural pathosystem. *Journal of Sustainable Agriculture and Environment.* https://doi.org/10.1002/sae2.70146
- **Leybourne DJ** et al., 2025. Can artificial intelligence be integrated into pest monitoring schemes to help achieve sustainable agriculture? An entomological, management and computational perspective. *Agricultural and Forest Entomology.* https://doi.org/10.1111/afe.12630
- **Leybourne DJ**. 2024. How does vector diversity influence the transmission efficiency of yellow dwarf virus? Perspectives from a review. *Plant Pathology.* https://doi.org/10.1111/ppa.13871
- **Leybourne DJ** et al., 2024. Thresholds and prediction models to support the sustainable management of herbivorous insects in wheat. A review. *Agronomy for Sustainable Development.* https://doi.org/10.1007/s13593-024-00965-5
- **Leybourne DJ** et al., 2024. Genetic diversity in vector populations influences the transmission efficiency of an important plant virus. *Biology Letters.* https://doi.org/10.1098/rsbl.2024.0095
- Aradottir GI & **Leybourne DJ**. 2022. Common resistance mechanisms are deployed by plants against sap-feeding herbivorous insects: insights from a meta-analysis and systematic review. *Scientific Reports.* https://doi.org/10.1038/s41598-022-20741-3
- **Leybourne DJ** et al., 2022. Drought stress increases the expression of barley defence genes with negative consequences for infesting cereal aphids. *Journal of Experimental Botany.* https://doi.org/10.1093/jxb/erac010

Academic Service & Meeting Invitations

Committees & Memberships

- Member: Wheat Initiative - Expert Working Group on Pests.
- Member: The Insecticide Resistance Action Group - UK
- Founder: The Insect-Vectored Crop Virus Network.

Grant and Fellowship reviews

- The Food Planet Prize – The Curt Bergfors Foundation, Sweden (Grant): 2026
- Department of Agriculture, Fisheries, and the Marine, Ireland (Grants): 2025
- BBSRC, UK (Responsive Mode): 2025
- Swiss National Science Foundation, Switzerland (Fellowships): 2025, 2024, 2022
- Fondecyt National Funding Program, Chile (Grant): 2024
- British Ecological Society, UK (Various): 2021 – Present

Keynote, Plenary & Panel Member Invitations

- 'Ento 26. UK. 2026. Invited Presentation – Symposium on Direct and Indirect effects of anthropogenic change on insects.
- International Wheat Congress. Bologna, Italy. 2026. Invited Presentation – Wheat Pest Workshop.
- International Wheat Congress. Bologna, Italy. 2026. Invited Panel Member: Discussion on insecticide resistance and IPM.
- Microbiomes for Resillient Crops. London, UK. 2026. Invited Panel Member: Discussion on sustainable IPM.
- International workshop on pest control under drought. University of Talca, Chile. 2024. Keynote speaker.
- Monogram Conference, Leeds, UK. 2022. Plenary speaker.

Fellowships and Grants

I have been involved in several academic and industry-funded projects centred on smart and sustainable pest and disease management. The total value of all funded projects is >£1.2M.

Total award as PI: *c.* £362k. Award as Co-I: *c.* £217k

2022-2025: The Royal Commission for the Exhibiition of 1851. Research Fellowship (PI).
Elucidating the agro-ecological factors influencing virus success in cereal ecosystems. Total value *c.* £200k.

2022-2024: Innovate UK. Farming Innovations Programme – Feasibility Study (Co-I).
Adaptive AI-enabled and context-enhanced mobile intelligence for climate-smart pest management. Total project value £530k; direct budget: £85k.

2021-2022: The Alexander von Humboldt Founation. Research Fellowship (PI).
The Agricultural Landscape and Arthropod biodiversity Nexus: ALAN. Total value *c.* £150k.

2021-2022: The British Ecological Society. Large Research Grant (PI).
Landscape effects on endosymbionts of the cabbage stem flea beetle. Total value *c.* £12k.

2021-2022: Innovate UK. Farming Innovations Programme – Feasibility Study (Co-I).
integrating visual and context information into a mobile intelligence solution for sustainable management of wheat pests. Total project value £300k; direct budget: £100k.

2022: BBSRC. Pump-Prime Business-Academic Partnership Grant (PI).
NemaRecognition: An AI- and molecular-driven pipeline for plant parasitic nematode recognition. Total project value £75k; direct budget: £25k.

2019-2021: The Agriculture and Horticulture Development Board. Research Grant (Co-I).
Provision of information on the the pyrethroid sensitivity of *Rhopalosophum padi* and *Sitobion avenae*. Total project value £15k; direct budget: £7.5k.

Teaching & Supervision

In 2025 I achieved ***Associate Fellowship*** status at ***Advance HE.***

Teaching, Supervision and Assessment

- Life 112: Animal Biodiversity. Lecutre series. Delivered to >200 students. Liverpool University (2024-2025).
- LIFE 223: Essential Skills for Life Science. Seminar series and assignment assessments. Delivered to 5-7 students. Liverpool University (2023 – 2025).
- MSc project supervision and assessment: One student. Hannover University (2021/22).
- MBiolSci project supervision and assessment: Two students. Liverpool University (2025).
- Undergraduate project supervision and assessment: Six students. Liverpool University & Hannover University (2021-2025).
- Summer students: Two students, one funded by British Society of Plant Pathology Studentship. Liverpool University (2025).

Postgraduate Supervision and Assessment

PhD student supervision:

- Andrea Ceribelli, Liverpool University (2023 – 2027). Second supervisor. Aphid symbionts as drivers of community dynamics.
- Qiuchen Luo, Liverpool University (2024 – 2028). Second supervisor. Plant health in urban landscapes.

PhD and MRes thesis examinations:

- Melbourne University, Australia. 2026. (PhD). Topic: Aphid-endosymbiont interactions and biocontrol.
- Liverpool University, UK. 2024 (MRes). Topic: Sustainable agriculture.

Full Bibliography

- **Leybourne DJ,** Zytynska SE, Martin EA. 2026. Top-down and bottom-up landscape processes influence the formation of microbial partnerships in herbivorous insects. *bioRxiv.*
- **Leybourne DJ** et al., 2026. A defensive symbiont and a plant virus confer direct and discrete phenotypes to a cereal aphid in a context-dependent manner. *Ecological Entomology.* https://doi.org/10.1111/een.70099
- **Leybourne DJ** et al., 2026. Competency for yellow dwarf virus transmission in the rose-grain aphid, Metopolophium dirhodum, is driven by virus species not vector genotype. *Plant Pathology. https://doi.org/10.1111/ppa.70182*
- Preedy KF ..... **Leybourne DJ.** 2026. A modelling framework to estimate vector dispersal and disease spread in an important agricultural pathosystem. *Journal of Sustainable Agriculture and Environment.* https://doi.org/10.1002/sae2.70146
- **Leybourne DJ** et al., 2025. Molecular Screening and dose-response assays provide insights into pyrethroid resistance in four agriculturally important aphid species. *Crop Protection.* https://doi.org/10.1016/j.cropro.2025.107315
- **Leybourne DJ**. 2025. Genetic diversity and association with bacterial endosymbionts influence phenotype in two important cereal aphid species. *Bulletin of Entomological Research.* https://doi.org/10.1017/s0007485325000124
- **Leybourne DJ** et al., 2025. Can artificial intelligence be integrated into pest monitoring schemes to help achieve sustainable agriculture? An entomological, management and computational perspective. *Agricultural and Forest Entomology.* https://doi.org/10.1111/afe.12630
  - Highly cited paper award.
- Yuan Z et al., 2025. PestGPT: Leveraging Large Language Models and IoT for Timely and Customized Recommendation Generation in Sustainable Pest Management. *IEEE Internet of Things Magazine.* https://ieeexplore.ieee.org/abstract/document/10815049
- Yuan Z et al., 2025. PEZEGO: A precision agriculture system based on large language models and internet of things for pest management. *IEEE Internet of Things Journal.* https://ieeexplore.ieee.org/abstract/document/11084900
  - Describes smart app for pest management. Available on apple and google stores.
- **Leybourne DJ**. 2024. How does vector diversity influence the transmission efficiency of yellow dwarf virus? Perspectives from a review. *Plant Pathology.* https://doi.org/10.1111/ppa.13871
- **Leybourne DJ** et al., 2024. Thresholds and prediction models to support the sustainable management of herbivorous insects in wheat. *Agronomy for Sustainable Development.* https://doi.org/10.1007/s13593-024-00965-5
- **Leybourne DJ** et al., 2024. Genetic diversity in vector populations influences the transmission efficiency of an important plant virus. *Biology Letters.* https://doi.org/10.1098/rsbl.2024.0095
  - 2024 ECR award (runner-up).
- **Leybourne DJ** et al., 2024. Sharing the burden: Cabbage stem flea beetle pest pressure and crop damage are lower in rapeseed fields surrounded by other rapeseed crops. *Agriculture, Ecosystems and Environment.* https://doi.org/10.1016/j.agee.2024.108965
  - Based on research led by MSc student.
- Manentzos AN ... **Leybourne DJ**. 2024. Low prevalence of secondary endosymbionts in aphids sampled from rapeseed crops in Germany. *Bulletin of Entomological Research.* https://doi.org/10.1017/s0007485324000063
  - Based on research led by BSc student.
- Li S et al., 2024. An effective farmer-centred mobile intelligence solution using lightweight deep learning for integrated wheat pest management. *Journal of Industrial Information Integration.* https://doi.org/10.1016/j.jii.2024.100705
- **Leybourne DJ** et al., 2023. Common facultative endosymbionts do not influence sensitivity of cereal aphids to pyrethroids. *Agricultural and Forest Entomology.* https://doi.org/10.1111/afe.12539
- Luke SH et al., 2023. Grand challenges in entomology: Priorities for action in the coming decades. *Insect Conservation and Diversity.* https://doi.org/10.1111/icad.12637
- Ramirez CC ... **Leybourne DJ**. 2023. To tolerate drought or resist aphids? A new challenge to plant science is on the horizon. *Journal of Experimental Botany.* https://doi.org/10.1093/jxb/erad012
- **Leybourne DJ** et al., 2022. Development of a pest threshold decision support system for minimising damage to winter wheat from wheat bulb fly, *Delia coarctata. Annals of Applied Biology.* https://doi.org/10.1111/aab.12718
- Aradottir GI & **Leybourne DJ**. 2022. Common resistance mechanisms are deployed by plants against sap-feeding herbivorous insects: insights from a meta-analysis and systematic review. *Scientific Reports.* https://doi.org/10.1038/s41598-022-20741-3
- **Leybourne DJ** et al., 2022. Drought stress increases the expression of barley defence genes with negative consequences for infesting cereal aphids. *Journal of Experimental Botany.* https://doi.org/10.1093/jxb/erac010
- Escudero-Martinez et al., 2021. Plant resistance in different cell layers affects aphid probing and feeding behaviour during non-host and poor-host interactions. *Bulletin of Entomological Research.* https://doi.org/10.1017/s0007485320000231
- **Leybourne DJ** et al., 2021. Drought has negative consequences on aphid fitness and plant vigor: Insights from a meta-analysis. *Ecology and Evolution.* https://doi.org/10.1002/ece3.7957
- **Leybourne DJ** et al., 2020. The price of protection: a defensive endosymbiont impairs nymph growth in the bird cherry-oat aphid, *Rhopalosiphum padi. Insect Science.* https://doi.org/10.1111/1744-7917.12606
  - Highly cited paper award.
- **Leybourne DJ** et al., 2020. A fitness cost resulting from Hamiltonella defensa infection is associated with altered probing and feeding behaviour in *Rhopalosiphum padi. Journal of Experimental Biology.* https://doi.org/10.1242/jeb.207936
- Preedy F et al., 2020. Learning-induced switching costs in a parasitoid can maintain diversity of host aphid phenotypes although biocontrol is destabilized under abiotic stress. *Journal of Animal Ecology.* https://doi.org/10.1111/1365-2656.13189
- **Leybourne DJ** et al., 2019. Defence gene expression and phloem quality contribute to mesophyll and phloem resistance to aphids in wild barley. *Journal of Experimental Botany.* https://doi.org/10.1093/jxb/erz163

Books and Book Chapters

- **Leybourne DJ** & Tungadi T (Eds). Advances in understanding and managing crop viruses. In Production
- **Leybourne DJ** et al., 2023. Online decision support systems, remote sensing and artificial intelligence applications for wheat pest management. IN: Advances in understanding insect pests affecting wheat and other cereals.