ROTHAMSTED RESEARCH

Science Initiatives Catalyst Awards

CAPABILITY

Exploiting the insect microbiome for novel crop protection applications – a target and discovery opportunity for novel biologically active molecules

By David Withall

How did the funding enable you to do something new?

It allowed us to combine RRes expertise in Chemical Ecology of agricultural pests with expertise in Environmental Microbiology to develop the area of Insect Mircoecology investigating the role and impact of insect endosymbiont population and dynamics on pest insect behaviour. This field of research is currently experiencing a lot of focus, particularly due to improvements of sequencing technology reducing the costs for analysis that allow us to generate the large datasets required.

What were the benefits for science of being able to do something new?

The SICA funding allowed RRes to develop this new area of research in insect microecology with a focus on endosymbionts, capitalising on our expertise in related fields and positioning ourselves at the forefront of this emerging field. Furthermore, developing an understanding of the composition and role of insect microecology of agricultural pests offers us the opportunity to develop novel crop protection tools that are species-specific, reducing the impact on natural biodiversity.

What were the wider follow-on benefits of having the funding ?

Identification of a potential new method of controlling agricultural pests through modulation of insect microecology. Currently being trialled and investigated under laboratory conditions.

Were there any other outcomes?

Current work focuses on development of new imaging methods for visualising location and distribution of insect endosymbionts (links to Bioimaging, CT scanner, biomolecular NMR). Initiated a new collaboration with Muni University (Uganda). Training was provided for a colleague who has taken up a role in the Growing Health team.

Did you win any further grants as a result of the SICA funding?

Three grants were applied for :

"Does the diversity of endosymbionts assist in niche and environmental adaption of Fall Armyworm across continental borders?" (NERC-FAPESP Seedcorn 2023; £100,000; 12-months; Rejected) PI - Withall, Co-I - Clark, Apangu, International Co-I Abaca (Uganda, Muni University), Wouters (Brazil, UFSCar), Gusmao (Brazil, Embrapa)

"The Inside Story: Role and temporal dynamics of endosymbionts in the resilience of aphids to changing abiotic and biotic stresses." (BBSRC Responsive Mode, RM 1 2024; £1,413,081; 48-months; Rejected) PI - Withall, Co-I Clark, Apangu, Milne, Hassal, Helps (decision expected Sept/Oct 2024)

"Investigating secondary metabolite-based resistance in ancestor wheats against cereal aphids Rhopalosiphum padi and Sitobion avenae" (BBSRC Responsive Mode, RM 2 2023; £700,780; 36-months; Rejected) PI - Caulfield, Co-I Birkett, Withall, Clark

We were successful in winning this one:

"Does the diversity of endosymbionts assist in niche and environmental adaption of Fall Armyworm across continental borders?" (IIP; £33,000; 6 months) PI - Apangu, Co-I Withall, Clark

Were any publications possible?

Yes, "Endosymbiotic Bacteria Composition in Cereal Aphids is Modified under Controlled Environmental Conditions", Godfrey Apangu, Ian Clark, Mike Birkett, David Withall; Frontiers in Ecology and Evolution, Currently Under review