

Project title and location:

Combatting pesticide resistance. Location- Fera, Sand Hutton

IAFRI background:

The Institute for Agri-Food Research and Innovation (IAFRI) is a joint venture between Newcastle University and Fera Science Ltd and a unique model for how universities can work with private sector research organisations. It operates under a private-public ownership to deliver both public good research and services as well as innovation and wealth creation in strategically important industrial sectors in the UK. Students will have a unique opportunity to benefit from supervision and facilities at both the Newcastle and Sand Hutton campuses to deliver research with real-world impact.

Lead Supervisors (and contact): For more information and details on how to apply please contact Neil Audsley (neil.audsley@fera.co.uk/01904 462628), or David George (david.george1@newcastle.ac.uk)

Key research gaps and questions:

Resistance to synthetic chemical insecticides in several key pest species and the restrictions in conventional pesticide is threatening the production of some major crops in the UK. There is a need to develop alternative strategies that protect crops from pest damage whilst safeguarding health, the environment and non-target organisms. This project will investigate whether natural (botanical) compounds can fulfil this role.

Project Description:

The control of pests in broad-acre agriculture relies heavily on a limited number of synthetic chemicals and is likely to remain the case for the foreseeable future. More than 600 pest species have developed resistance to one or more existing pesticides, including some major pests in the UK (e.g. *Myzus persicae*, *Meligethes aeneus*). However, metabolic resistance can be nullified through the use of synergists, such as botanical materials, which inhibit the enzymes involved in pesticide degradation, making pesticides more effective. Emerging evidence also exists demonstrating that botanical bio-synergists can increase the effectiveness of certain bio-pesticides.

The project will focus on counteracting pesticide resistance using natural botanical compounds to enhance/restore pesticide efficacy. Using in vitro and in vivo assays, botanicals will be tested to determine whether they can:

- a) Selectively enhance pesticide efficacy, whilst being safe for crops and beneficial insects.
- b) Reduce the quantity of active ingredient required for effective control thereby reducing environmental impact and cost.
- c) Restore effective control of resistant pests by partially or completely abrogating metabolic resistance thereby extending the effective life of current pesticides.
- d) Increase the effectiveness of biopesticides (e.g. entomopathogenic fungi).

Botanical bio-synergists could play a key role in current and future pest control. This project aims to build upon preliminary evidence for the bio-synergistic activity of botanical products to confirm and unlock their potential in current and future pest management.

Desired skills:

A minimum 2:1 (hons) degree or equivalent undergraduate qualification in a biological science. An interest in invertebrate pest control is required; a broader interest in agriculture, invertebrate biology and/or biochemistry is desirable. A good working knowledge of statistics and experimental design.