BBSRC-FAPESP JOINT PUMP–PRIMING AWARDS for AMR and INSECT PEST RESISTANCE IN AGRICULTURE: ***Understanding and managing resistance, including novel methods, for pathogen and pest control.***

PARTNERSHIP BUILDING WORKSHOP

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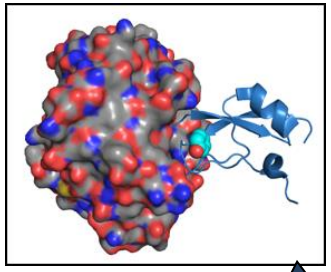
Understanding Plant-Pest Molecular Interactions For Crop Protection

FUNDAMENTAL SCIENCE

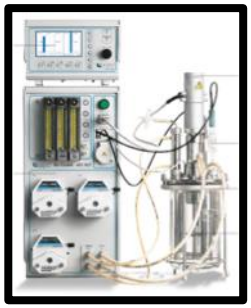
APPLIED SCIENCE

Molecular & Biochemical Bases Plant-Insect Interactions

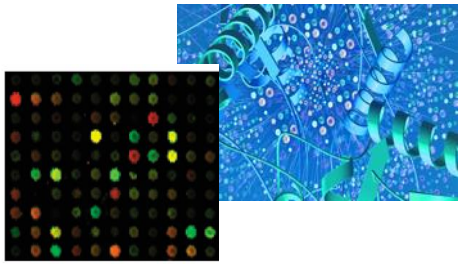


Novel approaches to crop protection

Novel Bio-pesticides

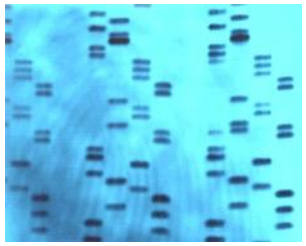


Functional Genomics (crop response to pests & pathogens)

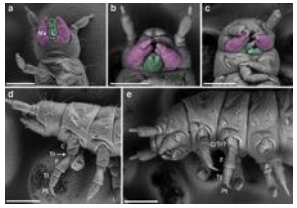


Molecular breeding of crops for improved sustainability

Crops by Design

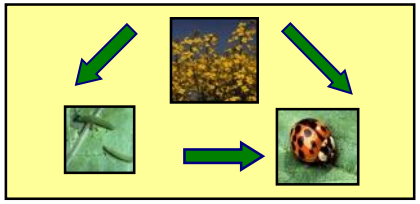


RNAi to identify Novel Targets



Food Safety

Environmental Impact



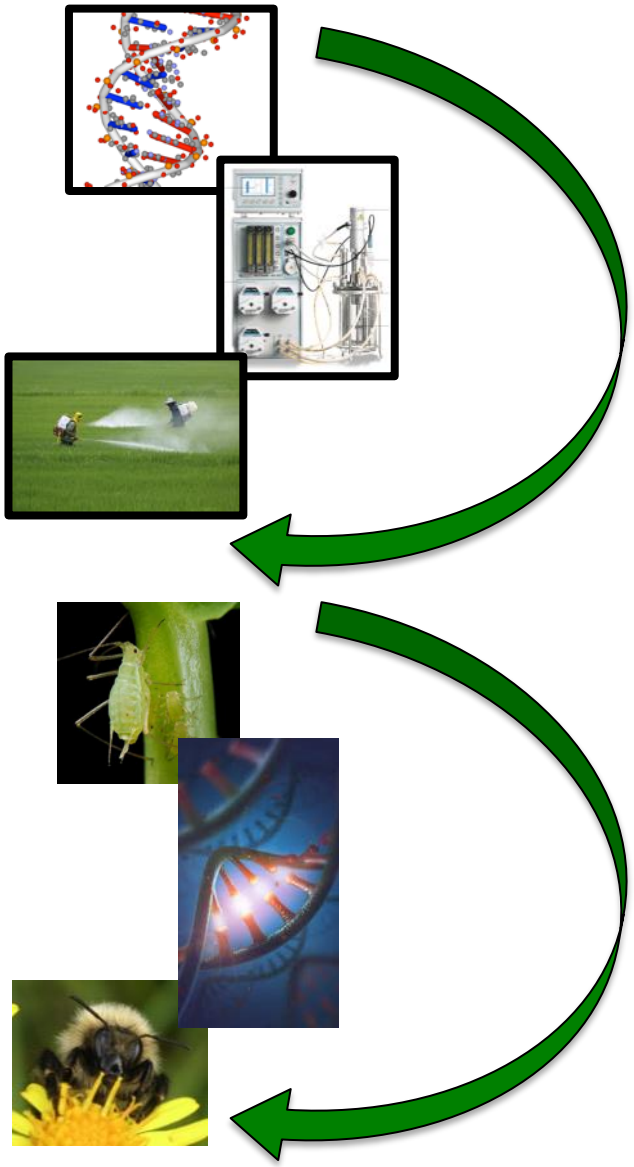
Development of Novel Environmentally-Friendly Bio-pesticides

Phase 1

- Identification of natural insecticidal compound
- Identification of suitable targets within the insect pest (for RNAi)
- DNA cloning & manipulation for heterologous expression
- Expression, purification, testing of biological activity

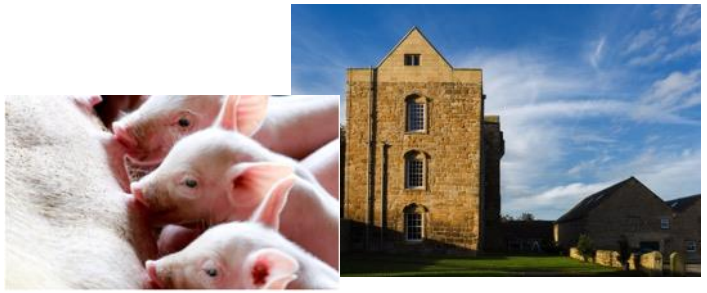
Phase 2

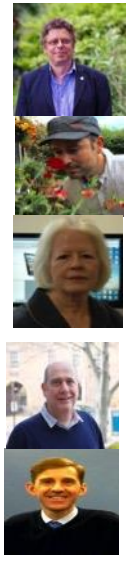
- Toxicological tests vs target insect pests
- Toxicological tests vs non-target insects including beneficials
- Effects on bee behaviour (Nakasu et al 2014)



NU-Farms Agri-Food Platform (under pinned by Social Sciences):

- Developing food production systems that are resilient, profitable and sustainable
- **Enhancing crop health, livestock health and animal welfare (breeding for resilience)**
- Understanding the environmental impact of current and future food production systems





Crop sensors, weather monitoring and disease modelling to identify infection risk and promote proactive crop protection

+

Use of rapid molecular diagnostic techniques to detect mycotoxins in forage and feed or in blood and tissue samples

+

Digital observations of animal behaviour, early identification of compromised animals and administration of mycotoxin binders

=

Improved whole of supply chain crop and feed protection strategies

Minimisation of mycotoxin contamination = safer food supply

CHAP CROP HEALTH & PROTECTION

BBSRC bioscience for the future

N8 AgriFood

CIEL

nu-food Food & Consumer Research Facility

nu-farms Agrisystems Innovation Platform

Newcastle University fera Institute for Agri-Food Research and Innovation

Challenge: Protecting crop production to feed a growing global population is one of the major challenges facing society today.

Issues

- Globally ca. 20% of crop yield lost to insect pests
- As vectors of plant diseases crop loss is significantly greater
- Impact of climate change on pest dynamics

Challenges

- Development of effective and sustainable approaches to crop protection through novel tools and molecules
- Reduce non-target effects

Solutions

- Understanding molecular responses of crops to pests and pathogens and *vice versa*
- Informed breeding for host-plant resistance
- RNAi-based approaches
- Fusion protein-based molecules (with DU)
- Approaches to **delay onset of resistance** in insect pest populations