

**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.***

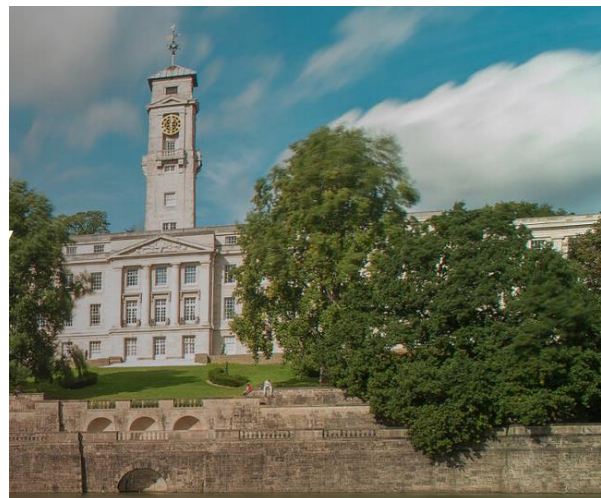
**PARTNERSHIP BUILDING WORKSHOP**

**SIMON AVERY, UNIVERSITY OF NOTTINGHAM**



**University of  
Nottingham**

UK | CHINA | MALAYSIA



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*Scientific expertise relevant to this call and priority areas of interest*

## 1. Underpinning mechanisms

Application of genetic and other tools to find mechanisms of action / resistance to fungicides and other agents.

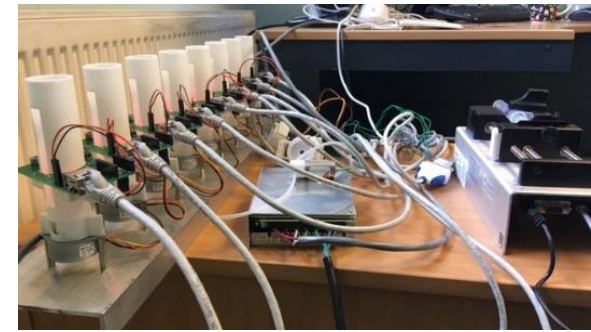
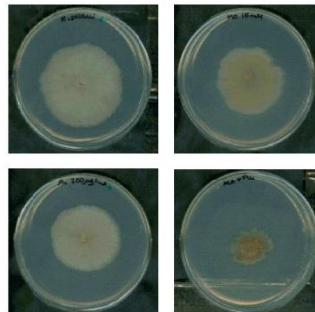
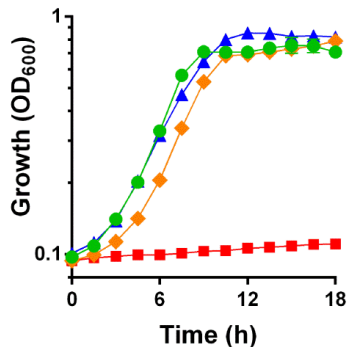
e.g., Vallieres, Avery, Holland (2017) Mitochondrial ferredoxin determines vulnerability of cells to copper excess. *Cell Chemical Biology* (in press).

Above targets are iron-sulphur proteins, important for accuracy of protein synthesis

In a related project: accuracy of protein synthesis is a novel target for combination-fungicides

Other relevant expertise:

- Population heterogeneity of drug resistance
- High-throughput chemical screens
- Exptl. evolution

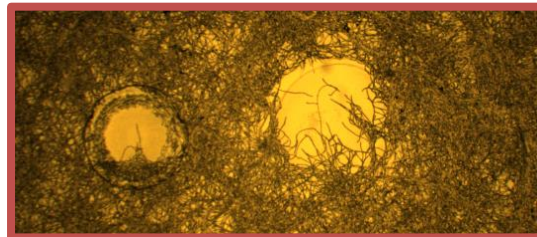


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## **2. Disease management and control**

- Synergistic combinations of fungicidal agents (protein fidelity target).
- Electrolysed water (EW) for post-harvest antimicrobial killing (w/ Prof. Ian Singleton): EW made in-situ from cheap, food-approved salts & water, negligible residues; 3-4 log microbial kill.
- Flash-UV for triggering anti-pathogen plant defences (Prof. Matt Dickinson)
- Food preservative formulations (w/ Gustavo Goldman, USP)
- Novel polymers resistant to fungal attachment (w/ Profs Morgan Alexander & Ricky Wildman)



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**Question:** *What key expertise/facilities can your institution offer? (1 slide)*

### **UoN Research Priority Areas include:**

Agriculture & Food Security (AFS)  
Antimicrobials & Antimicrobial Resistance (AMR)

### **UoN Beacons of Excellence**

“Future Food” is 1 of 6 beacons



### **Also at UoN**

MRC PhD doctoral training centre on AMR  
[Crops for the Future research centre \(Malaysia campus\)](#)  
A new >£10M Biofilms research centre (MRC)  
£15M Synthetic Biology Research Centre (BBSRC/EPSC)

FACILITATING THE WIDER USE OF  
UNDERUTILISED CROPS



### **At the School of Life Sciences**

State-of-the-art core facilities for Deep Sequencing, and Imaging  
Fungal Biology & Genetics; Bacteriology & Pathogenesis

**At the School of Biosciences:** Plant and Crop Sciences; Arabidopsis Stock Centre

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**Question:** *In your view, what are the main issues/challenges/solutions relevant to AMR and insect pest resistance in agriculture related to this call? (1 slide)*

- Issue: **Crop pathogens overcome genetic resistance and biocides**
- Solutions: (i) Integrate the application of agrichemicals and use of genetically resistant crops; in tandem with (ii) development of novel resistant cultivars and novel biocide actions, informed by understanding of underpinning mechanisms.
- Issue: **Agri-Biocides – as well as growing resistance: expense, environmental toxicity and legislation.**
- Solutions: Besides biocontrol etc, develop innovative, cleaner technologies for plant-pathogen control: e.g., (Brazilian-) natural products; non-coding RNA; antifungal-polymer spraying; flash UV irradiation for triggering plant defences; electrolysed-water antimicrobial spraying.