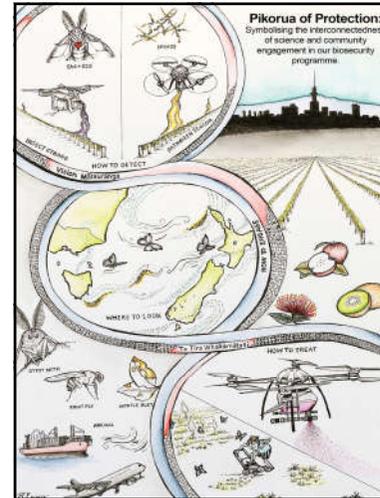




Pikorua of Protection: Integrated plant biosecurity for primary sectors and conservation lands

Tara Strand



Pikorua of Protection: Integrated plant biosecurity for primary sectors and conservation lands

Programme history



- Urban Toolkit Programme (2015-18)
 - Focused on insect pest eradication from the point in time a new pest has been discovered.
 - Urban focus as ports/airports are main pathway for new pest entry
 - New Zealand Biosecurity Science Award 2018
- Missed last year's rebid (as did a Plant and Food bid)
- To strengthen the second re-bid - merged with P&F
 - This year, second rebid was in 1st quintile for Scientific Excellence

Background

- Pest eradication is vastly more cost-effective compared to wide-area management following establishment
- The faster the process is from detection to treatment the higher the probability of achieving eradication
- Speed is everything
 - Detection
 - Delimitation
 - Community Engagement
 - Treatment
- Pathogen tools completely inadequate
- Insufficient tools for high-risk insect species (ie: brown marmorated stink bug, spotted wing drosophila)



Overall objectives

- Transform New Zealand's biosecurity
 - New technologies
 - Engagement practices
- Improve incursion response speed
 - Enabling successful eradication
- Protect New Zealand from plant biosecurity threats (insect and pathogen)
 - Maintain market access
 - Ensure market growth ambitions set forth by Government
 - Maintain social license to operate
 - Maintain biodiversity and ecosystem health
 - In turn, increases the health and wellbeing of New Zealand



New programme

- Think about bigger picture
- Identify where we can make a difference
- Take best teams approach (NZ & international collaborators)
- Focus on pathogens and high-risk insect species



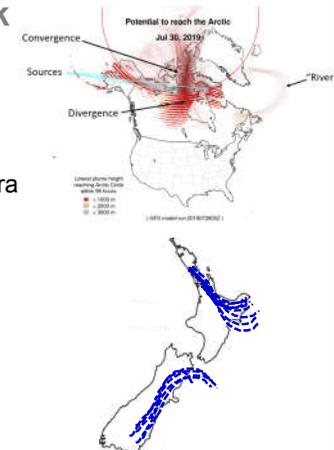
New programme

- **Where to Look:** Atmospheric transport pathways to identify zones with a high probability of pest detection
- **How to Detect:** New pathogen and insect sensors for real-time data collection and reporting
- **How to Treat:** Environmentally and socially acceptable eradication strategies and treatment tools
- **Data Sharing Framework:** Real time: data integration from networked sensors, model initiation, decision support tools to inform end-users.
- **Engaging NZ:** New engagement tools that 'bring life' to Biosecurity 2025 aspirations through partnerships (Māori, agencies & wider communities).



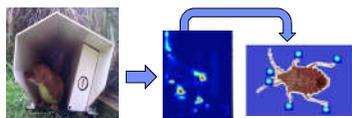
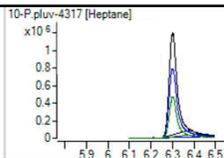
Key deliverables: Where to look

- Atmospheric Transport Pathways forecast
 - Trans-Tasman and Regional *operational*
 - Local *beta-operational*
 - Validated with tracer gases or spore tra



Key deliverables: How to Detect

- Mobile pathogen sensor(s) *proof of concept*
 - Using forestry pathogens as model systems for testing
 - Detection prior to visual symptoms
 - Application of lessons learned from Cyborg development
 - Miniaturisation
 - Boosting of signal above noise
- New machine learning insect sensors
 - Wing beat for multiple species *beta operational*
 - Touch-pad for insects that crawl after landing *proof of concept*
- New sound lure to increase attraction *beta operational*



Key deliverables: Cyborg

- Cyborg important for when pheromone is or difficult to synthesise
 - Use the insect as the 'sensor'
- Previous programme went to proof of concept
 - Confident it can be used for Gypsy moth
 - Further testing underway in Canada
 - Also testing system on Spruce Budworm

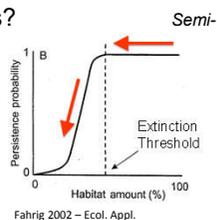


This programme:

- Use as a sensor to determine effectiveness of static traps
 - Define active space around a trap – major science challenge

Key deliverables: How to treat

- Targeted spraying for pathogens:
 - Spore dispersal risk
 - Design for social acceptability
 - Quantify environmental impacts
- Population density (allee) thresholds for pathogens? *new field of study*
 - Perhaps not all host plants need to be removed
- Integrated pest management tools
 - Brown marmorated stink bug
 - Spotted wing drosophila



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