Radical new 'Trojan Female' pest control approach shows great promise

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An innovative, non-lethal approach to pest management has the potential to become a "game-changer" in providing lasting and effective control in a wide range of insect and animal pests, according to New Zealand scientists developing the technique.

Researchers from the University of Otago, the University of Western Australia, the Ministry for Primary Industries, and Landcare Research today published findings about their proposed "Trojan Female Technique" (TFT) in the prestigious journal *Proceedings of the Royal Society B*.

The technique harnesses naturally occurring mutations in the maternally inherited mitochondrial DNA (mtDNA) that reduce male fertility while having little or no reproductive or other fitness impacts on females.

This means that 'Trojan Females' (TFs) and their female descendants carrying such mutations could potentially produce sterile males over multiple generations, leading to dramatic and lasting population declines.

Using mathematical models the researchers show how introducing TFs into pest populations, as either single large releases or relatively few small repeat releases, could be effective in providing population control within relatively few generations.

Study lead author Professor Neil Gemmell of the University of Otago's Department of Anatomy described the findings as a key advance towards

better protecting agriculture, human health and biodiversity from pests that cause or carry disease, or damage or consume valued resources.

"This could be a game-changer in reducing the global impact of pests. Conventional approaches to pest management usually involve lethal control, but such approaches are costly, of varying efficiency, and often have ethical issues."

Although the greatest effectiveness was predicted for high turnover species such as insects and rodents, the cumulative nature of multiple releases makes the TFT applicable across the broad range of animal pests, he says.

Globally, the impact of pests cannot be over-estimated. Malaria alone kills more than one million people each year, with upwards of 200 million new cases reported per annum, while invasive pests are a key threatening process impacting biodiversity.

Likewise, in agriculture, rats are estimated to spoil or damage up to 17 per cent of food production in some countries, affecting the socio-economic foundations of many emerging nations at a time when surety of food is an increasingly pressing issue for the world's population.

Based on the far-reaching gains addressing these issues will achieve, a new NZ$1 million research project funded by the New Zealand Ministry for Business Innovation and Employment (MBIE) is putting the researchers' innovative theory into practice.

The leader of the new MBIE project, Dr Dan Tompkins of Landcare Research, says "once we have achieved proof of concept in the laboratory, we will be looking to rapidly apply this new technology platform to the benefit of agriculture, human health and biodiversity both within New Zealand and globally."

Provided by University of Otago