



CSIRO submission to Inquiry into Red Imported Fire Ants in Australia

CSIRO Submission 23/860

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Executive Summary

CSIRO's applied/translational research supports Australia's preparedness and response in the face of biosecurity threats and impacts. This submission provides brief descriptions of the broad work CSIRO is conducting that contributes directly and indirectly to the national Red Imported Fire Ant (RIFA) eradication program. These broadly address the following Terms of Reference: (a) the expected costs and impacts, if RIFA spread across Australia, on human health, social amenity, agriculture, the environment, infrastructure, and regional workers; (d) the effectiveness of eradication efforts and the spread of fire ants; and (f) other related matters.

Eradication and Management Tools: CSIRO is in the advanced stages of developing a novel genetic bait that is highly specific to RIFA. CSIRO is progressing Unmanned Aerial Vehicle capacity for aerial utilities associated with eradications. CSIRO has proposed to conduct laboratory-based risk assessments as part of the process for importing biological control agents of RIFA.

Surveillance and Monitoring: CSIRO conducted the federal risk assessment for RIFA to inform biosecurity needs to help prevent further incursions. CSIRO has published data quantifying the capabilities of detector dogs to detect invasive ants which can then be used to calculate Probability of Eradication. CSIRO has been working with Murdoch University and other partners to develop an App that can identify numerous invasive ant species, including RIFA.

Strategic planning: CSIRO members serve on various committees, providing expert input and oversight of the RIFA program. CSIRO helps publish details of ant eradications so that there are written records that can be referred to in the future. CSIRO recently collaborated in the most comprehensive international assessment of the costs of invasive species, of which RIFA was a focal species. CSIRO was a major driver of the completion of a plan for improving invasive ant biosecurity and management throughout the Pacific to help reduce future risk of further incursions of RIFA into Australia.

Introduction

CSIRO welcomes the opportunity to provide input to the Senate Standing Committee on Rural and Regional Affairs and Transport inquiry into Red Imported Fire Ants in Australia.

Red Imported Fire Ant (RIFA), *Solenopsis invicta*, is well documented as having significant negative impacts on biodiversity, human health and interests, and economies¹. For example, the species has been reported to affect plant populations, alter invertebrate communities, cause stinging injuries to livestock, and kill small ground-dwelling vertebrates in invaded countries such as the United States of America and China^{2,3}. Given its potential negative impacts to the biodiversity of Australian native fauna and flora, RIFA is listed as a key threatening process under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). RIFA is also a serious threat to human health, with approximately 3 per cent of people at risk of serious reactions of anaphylaxis that can result in death⁴⁻⁶. As a result, infestations could affect recreation activities by making backyards, sporting grounds and local parks unsafe, as well as agricultural production where on-ground manual labour is required⁷. Combined, RIFA is a significant economic threat to Australia⁸.

To date, Australia has been successful at eradicating seven discrete RIFA incursions, with one of those eradications being the largest ant eradication in the world⁹⁻¹¹. The persisting incursion in SE Queensland is notably much larger than all the other prior populations that have been successfully eradicated and remains challenging to eradicate¹². The recent review of the eradication program suggested that additional research and tools are needed to support the eradication efforts^{13,14}.

This submission provides brief descriptions of the broad work CSIRO is conducting that contributes directly and indirectly to the national RIFA eradication program, addressing the following Terms of Reference of this Senate Enquiry (a) the expected costs and impacts, if red imported fire ants are able to spread across Australia, on human health, social amenity, agriculture, the environment, infrastructure and regional workers; (d) the effectiveness of eradication efforts and the spread of fire ants; and (f) other related matters.

CSIRO response to the Terms of Reference

CSIRO conducts and proposes much research to provide technological advancement for biosecurity generally¹⁵. In addition, some CSIRO research underpins the protocols of some current ant eradication programs^{16,17}, and over the past 20 years CSIRO has been a core partner of governments and agencies that have achieved some of the most globally significant ant eradications in the world at various scales^{9,18-20}. Outlined below are descriptions of the broad work CSIRO is conducting that contributes directly or indirectly to the RIFA program.

Eradication and management tools:

- CSIRO is developing novel RNA-interference (RNAi) management tools, with one project specifically targeting RIFA. RNAi is a genetic technology that can be used to manage pests like ants²¹. It is highly species-specific and works by silencing genes to kill or reduce the reproductive potential of target species. CSIRO recently completed a research project funded by the US Department of Defence (DoD), which has enabled the development and testing of RNAi for RIFA management. The ongoing RNAi laboratory trials are now achieving >50% mortality in worker ants. Pending regulatory approval, it is envisaged that this tool can provide treatment solutions in areas that are ecologically sensitive (e.g. around waterways), on commercial farms (including those with livestock), as well as in domestic/urban contexts.
- Biological control can be a landscape-scale management option for RIFA, if the candidate agents are demonstrated to be safe enough for release in an Australian context. Numerous biological control agents have been identified for RIFA and used in the United States. Of these, the pathogenic microsporidium *Kneallhazia solenopsae* and the virus SINV3 have been the most virulent, capable of killing entire colonies²². Notably, both agents can also affect the closely related tropical fire ant, *Solenopsis geminata*, which is established in northern Australia. Six species of phorid flies in the genus *Pseudacteon* have also been established in the US as biological control agents for RIFA, but their contributions to RIFA management is variable²³. CSIRO has developed proposals to conduct laboratory-based risk assessments of *K. solenopsae* and the SINV3.
- CSIRO has conducted research into advancing Unmanned Aerial Vehicle (UAV) technologies and their utility in a biosecurity context, including within ant eradication programs. Recently, CSIRO published data quantifying the relative capabilities of various aerial application options, including advanced UAV technology²⁴. This provided a predictive understanding of the relative capabilities and merits of the different systems, as well as the ability to provide precision in their costs prior to their use. CSIRO has helped facilitate discussions between the RIFA eradication program and specialist UAV providers both within and outside of Australia, to enable UAV-based applications of pesticides as part of the RIFA program.

Surveillance and monitoring

- In the past, CSIRO has conducted a risk assessment of RIFA arriving in Australia via multiple modes of transport and association with a wide range of goods²⁵. The report demonstrated the need for ongoing vigilance for RIFA. It also identified goods and locations that are at highest risk of supporting new RIFA incursions, and therefore of highest priority for biosecurity inspections.
- In a world first, CSIRO recently published data quantifying the capabilities of detector dogs to detect invasive ants²⁶. This was then combined with modelling to be able to provide an effort-based and efficacy-based quantification of the probability of eradication being achieved within assessment areas. This work is applicable to all invasive ant species and eradication attempts.
- With the support of a recent Biosecurity Innovation Program grant, CSIRO has been working with Murdoch University and other partners to develop an App that can identify numerous invasive ant species, including RIFA. This App is nearing completion.

Strategic planning

- CSIRO staff serve on multiple committees that provide input or oversight of the RIFA eradication program. This includes the current Science Advisory Committee, the National Biosecurity Management Consultative Committee, and the National Management Group. These staff provide science insights and advice into all matters pertaining to protocols, feasibility, cost benefit analyses, and others matters related to the terms of reference of these committees.
- Over the past two decades, CSIRO has engaged with people involved with the numerous RIFA eradications that have occurred in Australia, as well as eradications of other invasive ant species, to support the publication of results from these eradication records^{9,10,27}. The Western Australian Department of Primary Industries and Regional Development has recently succeeded in eradication of RIFA from Fremantle and CSIRO is supporting a similar synthesis and publication of results from that work. These publications are a resource available to support other ant eradication efforts and response plans.
- CSIRO collaborated in the most comprehensive international assessment of the costs of invasive species, both in terms of management and impact. Ants were focal in multiple publications, with RIFA receiving specific attention^{28,29}.
- CSIRO was a major driver of the completion of a plan for improving invasive ant biosecurity and management throughout the Pacific^{30,31}. RIFA was a focal species in that plan. It is envisaged that the implementation of this plan will reduce future risk of further incursions of invasive ants into Australia.

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