Australian Government
Department of Agriculture, Water and the Environment

Adaptive area-wide management of QFly using SIT

Guidelines for efficient and effective pest suppression and stakeholder adoption

Horticulture Innovation Australia Limited

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This summary is an excerpt from the final report, with minor edits made to ensure it meets departmental style and accessibility requirements.

Summary

The three-year Queensland Fruit Fly Area-wide Management (QFAM) project was undertaken with the aim to support the successful incorporation of Sterile Insect Technique (SIT) into the management of Queensland fruit fly (Qfly). Qfly is a major pest of Australian horticultural crops, currently causing millions of dollars-worth of damage across Australia and it presents a major barrier to market access. Broad goals of the project were to ensure a thriving and sustainable horticulture sector, realise improved productivity and profitability for producers, remove the limitation that Qfly poses to commercial production and market access, and establish a framework for area-wide management (AWM) uptake of SIT within AWM for Qfly (SITplus). To achieve these broad goals, two key project goals were met:

1) communities have an informed basis of current best technology to consider SIT as part of AWM in Qfly management
2) guidelines for SIT incorporation into AWM of Qfly are workable and accepted.

The research focused on study regions in southern Australia (Sunraysia, Murray/Goulburn Valley [MGV] and the Riverland). The results of the project have been extended over a larger region, including into northern NSW and southern Queensland. The multidisciplinary nature of the project incorporated diverse research methods to undertake the activities, including interviews, discussion groups and surveys for the social science and economics research, as well as expert elicitation, spatial simulation modelling and field studies for the biophysical research.

Within the scope of this research three potential economically-viable implementation strategies for AWM including SIT of Qfly under Australian conditions include:

1) outbreak eradication (and potentially maintenance of area freedom, should legislation allow)
2) spatially-isolated contexts (including in support of industry-specific market access)

3) more effective management in an urban context than existing ad hoc approaches. Before SIT deployment each region should be considered in the context of landscape, suppression potential and economic impact.

There are likely to be significant gains from applying AWM and SIT for pest outbreak eradication in designated pest free areas. However, while modelling has shown AWM will lead to pest suppression, the broad economic study showed that management of established populations across very large areas using SIT within an AWM approach appears unlikely to be an appropriate objective, given that the time to see financial returns from new market access (dependant on eradication) is uncertain. There are a number of other assumptions behind this conclusion, particularly relating to pesticide use and impacts, based on our assessment of the current situation (as of May 2017).

The results are sensitive to our findings of negligible production losses due to Qfly once managed and the estimated time taken to realise future benefits. We also recognize there are uncertainties, including the time taken to realise future benefits, the potential for market access and changes to chemical controls going forward. Nevertheless, market access will clearly be an issue for some regions with sensitive products or markets (for example Tasmania and cherries) and SIT may play a role in supporting this. Also to note, this assessment was made in isolation of the management of multiple pests in these regions; understanding the introduction of SIT in the context of Integrated Pest Management (IPM) may provide some overall benefit that outweighs the cost.

When it comes to deployment strategies for sterile flies, our research indicates that it will be of benefit to work with fruit industry bodies and/or a committee comprising an amalgam of government and industry organizations (with an important role for local councils in urban areas, which the general public tend to look to for leadership) in implementing AWM and SIT. These are the institutions most trusted by communities to manage Qfly and can enable coordination and communication of actions. Although there was evidence of inertia and a preference for maintaining the status quo for growers across all three regions, there was also positive and large willingness to pay (WTP) among growers for Qfly management in towns as well as a SIT program component. Urban residents also exhibited a positive WTP.

In terms of releases, our biophysical research has generated valuable risk maps for three case study regions (Sunraysia, MGV and Riverland). Such maps are essential to the development of a future tool or system for planning releases, as well as for ongoing AWM and monitoring programs. We also highlight the need to consider that complex landscapes, containing a higher diversity of hosts that fruit across different seasons, will pose greater challenges in achieving population suppression and require adoption of AWM strategies in readiness for SIT to be incorporated into an AWM program. Urban areas pose a significant challenge, as these areas provide a reservoir of flies throughout the year with potential to move into nearby crops. Our biophysical models can identify potential hotspots and bottlenecks in space and time which can be used to develop more targeted and effective SIT release strategies. Year-round efforts provide greatest benefit, but when resources are limited the modelling showed that an urban treatment is most effective when reducing populations in late winter/early spring before they can move into the agricultural area.

The outcome of the project has been to integrate transdisciplinary research to deliver two key outputs for industry:

1) Guidelines for adaptive area-wide management (AWM) using Sterile Insect Technique (SIT) the present report for SITplus which identifies the next steps needed to produce and deploy sterile males for managing Qfly populations.
2) In addition to the research findings and Guidelines cited above, material outputs of the project for industry also include
    a) risk maps
    b) a quantitative assessment of willingness to pay that can be scaled on a per capita basis
    c) a scalable methodology by which the economic costs and benefits of implementing AWM and SIT can be assessed
    d) a spatial simulation model which allows a mechanistic exploration of the effects of management practices on pest suppression outcomes across space and time, which is easily adaptable to different locations and management settings.

Together, these outputs can assist in decision-making for AWM of Qfly including SIT going forward. With regard to the next steps for SIT, we advise that there is a clear ongoing need to engage expertise in AWM in order for the technology to be effective. Specifically, there is a need to coordinate actions and follow the steps of our AWM Guidelines: in regions with fly populations making release decisions in relation to the landscape context, which are informed by the results of monitoring the effects of management, and which are based on socio-economic analysis. The logical next step to support releases for SITplus is therefore to put in place the tools with which both strategic and tactical decisions for effective release can be made, informed by the findings of this project and building on the Guidelines and materials produced.

Practical learnings may then identify low cost and high effectiveness implementation strategies and socially responsible pathways, which could support SIT in more complex and larger landscape settings. This would allow for releases to be managed strategically and efficiently. The Adaptive area wide management of Qfly using SIT project is delivered by Hort Innovation in partnership with CSIRO, and is supported by funding from the Australian Government Department of Agriculture, Water and the Environment as part of its Rural Research and Development for Profit program. Further partners include QUT, Agriculture Victoria, NSW Department of Primary Industries, PIRSA, SARDI, Wine Australia and BioFly.