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Red Imported Fire Ant – The Multi-Million Dollar Impact on Nursery Production

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Summary

Red Imported Fire Ant (RIFA) was first detected in South East Queensland (SEQ), Australia, in February 2001 at a property in the suburb of Richlands, Brisbane. Subsequent tracing and investigation identified further outbreaks at the Port of Brisbane and Verrierdale in the Sunshine Coast Hinterland in 2001. The Queensland Government, along with Australian State, Territory and Commonwealth Government, agreed to a national RIFA eradication program to be cost shared between government Parties; however, a cohesive structured funding program was not fully agreed to until 2017.

Over the first 16 years of the program the Queensland Government was forced to secure annually a commitment to cost share funding, from each government Party, totaling $367 million over that period. In 2017 a 10-year plan was agreed by Parties, from 2018 onwards valued at $411.4 million, however in 2023 a revised total of $592.8 million over 5 years to 2027 was agreed (Scott-Orr et al. 2021).

As one of the most invasive species known, it is critical that Australia eradicates RIFA to ensure our way of life for future generations is unaltered and that our environment is protected. RIFA is a pest of the environment, more so than horticulture, where if established it dominates the invertebrate world out competing or killing native insects and small animals. The ant has been known to 'farm' plant pests such as aphids within cropping systems which add to growers' pest pressures and further enhances worker exposure and subsequent health impacts from stings. Estimates put the annual heath impacts to the Australian community at a third being stung of which 25% will develop an allergic reaction, and between 43,000 to 174,000 people in Australia will require medical assistance, annually.

The production nurseries in SEQ have been battling RIFA since 2001 with many having been in the fight for 24 years, others are only now being impacted as the incursion expands in size. The costs associated with the pest are high, however, vary due to market access, treatment, site management, lost markets, etc., costing the sector in SEQ more than $20 million annually. These are costs that are unlikely to be recovered due to the highly competitive plant production sector and are absorbed by growers as a 'cost of doing business'. When governments fail to protect our borders and manage pest incursions it is industry that must bear the cost, often in perpetuity.

The author of this paper has been extensively involved in the Australian RIFA response since inception, first as the Queensland Industry Development Manager (1996 to 2015) and subsequently as the Greenlife Industry Australia National Biosecurity Manager/Director RDE and Biosecurity (2016 – to date).

INTRODUCTION

Red Imported Fire Ant (RIFA) (*Solenopsis invicta*) is a highly invasive species of ant native to South America (Argentina, Brazil, Paraguay, Uruguay) having spread to the United States of America, Taiwan, China, Japan, Philippines and Australia (NFAEP, 2024). The ant is highly adaptable, omnivorous (eats plants and animals), aggressive possessing a stinger, similar to a bee, swarms out of nests, and has serious impacts on economies, environments and human health (Scott-Orr et al., 2021). RIFA is not a specific 'pest' of horticulture, in that it does not attack crops like usual plant pest insects, however the biology of the ant leads to having significant impacts on infrastructure such as vehicles, equipment, electrical systems (equipment and transmission), staff due to stings/hospitalisation, and market access to prevent the spread. The pest has significant impacts on the ecology of any area it infests due to the above characteristics and will decimate native vertebrates and invertebrates as they either feed on them, their young or out compete for food sources (Invasive Species Council 2024).

RIFA was first detected in Southeast Queensland (SEQ), Australia, in February 2001 at a property in the suburb of Richlands, Brisbane. However, it is estimated the incursion originated around 1992 (Scott-Orr et al. 2021), with some suggesting an even earlier incursion in the 1980's. Subsequent tracing and investigation identified further outbreaks at the Port of Brisbane and Verrierdale in the Sunshine Coast Hinterland later in 2001. The Queensland nursery industry, through the Nursery & Garden Industry Queensland (NGIQ) and the national peak industry body (Nursery & Garden Industry Australia now Greenlife Industry Australia (GIA)), have been heavily invested in eradication from the outset of the detection, response and planning from 2001 onwards.

These bodies supported the deploying of resources into the response with staff sitting on various committees, forums and working groups to contribute to the eradication of RIFA. These industry resources also worked with government to establish risk mitigation measures growers could apply, market access protocols allowing growers to trade, developed and conducted RIFA information workshops and coordinated industry research and information.

The RIFA infested zone in SEQ **(Fig. 1)** has increased from 40,000 ha in 2005 to more than 800,000 ha in 2024 with further RIFA detections, in 2024, at two locations in Northern New South Wales (South Murwillumbah and East Wardell) and in South West Queensland (Oakey and Meringandan West).

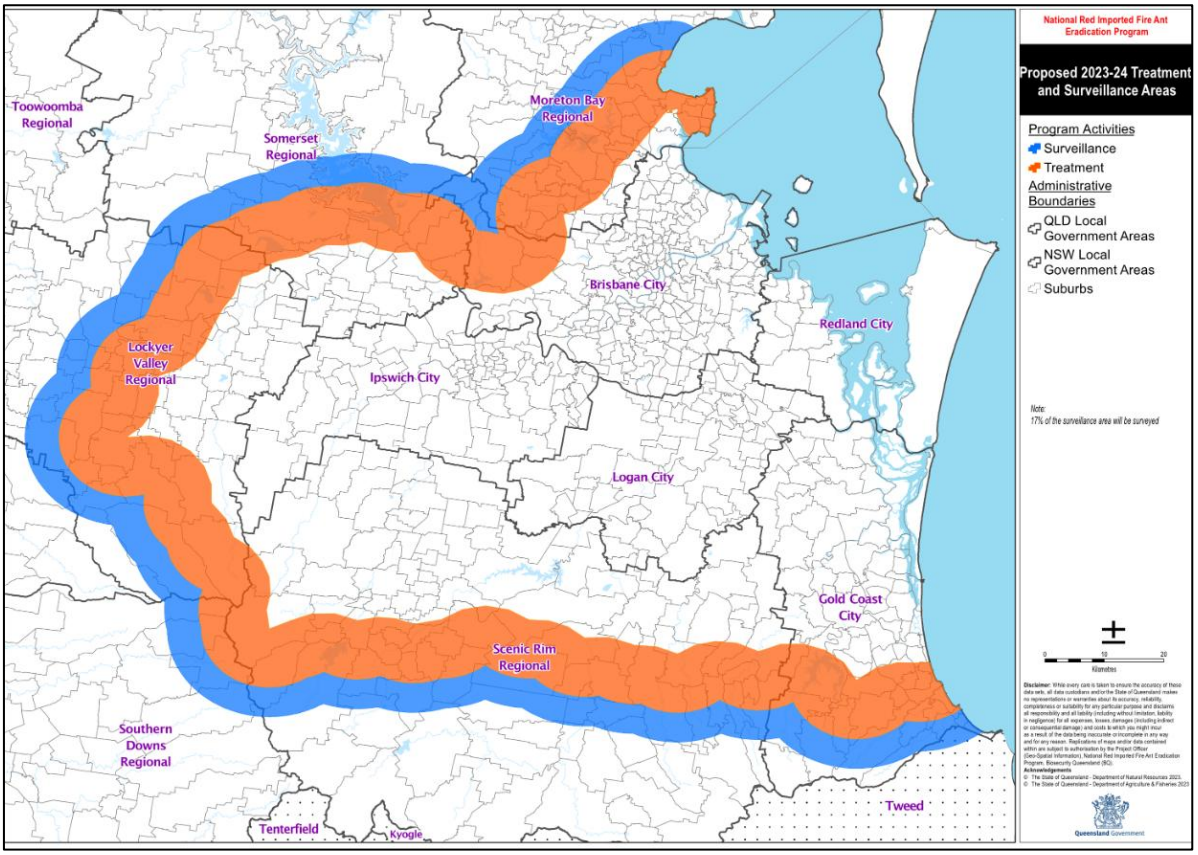

Figure 1. SEQ eradication surveillance and treatment zones for RIFA 23/24. Source: National Fire Ant Eradication Program (2024).

An independent review of the eradication program in 2021 estimated an annual eradication cost between $200 to $300 million per year is required to achieve success by 2032 ($2 to $3 billion). The Australian Institute advising in 2024 the actual cost to the economy without eradication is likely to be more than $22 billion, a public cost benefit of between $3 and $9 per dollar spent on eradication.

In 2006 the Nursery & Garden Industry Queensland surveyed growers in SEQ and established annual RIFA costs to industry (lost markets, regulatory compliance, risk mitigation, etc.) at that time exceeded $9 million per year however with the significant increase in area, more growers impacted, this cost per annum has grown exponentially now estimated at more than $20 million per annum in 2024.

Human health impacts of RIFA infestation are also severe. Approximately a third of the population in RIFA-infested areas are stung each year with about 20% causing a large local reaction and another 0.5% and 2% stings causing systemic allergic reactions which can range from skin symptoms to life-threatening anaphylaxis (Lopez et al., 2024).

THE PEST

There are two genotypes, monogyne and polygyne, with this referencing the cohabitation, or not, of RIFA colonies. A monogyne RIFA Queen and her colony will defend their territory against all comers, including other RIFA, whereas a polygyne RIFA Queen and her offspring will join with other RIFA Queens in super colonies of tens of millions of ants and hundreds of Queens. Disturbing these 'super' colonies can see small animals (e.g., sheep, lambs/calves) killed as they are swarmed over by thousands of RIFA. Queens typically fly within 5 km, some have been reported at 30 km in favourable wind conditions, from launch point however more commonly they appear to land at around 300m - 500m (NFAEP 2024).

RIFA are generally between 2 to 6mm in length (sterile female workers) with Queens approximately 10mm with a nest containing a great diversity of sizes and hundreds of thousands of ants. The ant is a coppery/reddish-brown colour with a black-dark brown abdomen (NFAEP 2024).

Nests can be a small 'bump' in the ground (**Fig. 2)** or a larger dome with both having no obvious entry/exit point as nests can have many dispersed entry/exit holes meters from the 'bump'. The size of nests is often associated with the age of the colony. It has been reported that when left unchecked a population of monogyne RIFA can have a nest density of 500/ha and polygyne populations at 5,000/ha (Scott-Orr et al. 2021). The dominant genotype in SEQ is the monogyne nest which are known to be smaller, less populated, yet travel further in mating flights (NFAEP 2024).

The Queen is the only reproductive member of her colony, with workers being sterile females, while production of alates (fertile winged males/females) are controlled by the Queen and periodically launch from nests (flying ants) to mate in the air from members of other colonies. New Queens land and can form a new colony as no further fertilisation is required across her 7-year life expectancy, male alates die after mating. The new Queen drops her wings upon landing and must find a suitable nesting site within hours otherwise she will die. It is believed that between 90% and 99% of these mated alates

do not go on to establish nests/colonies due to high predation rates, missed matings, unsuitable nesting sites, etc., (NFAEP, 2024).

The accepted norm for RIFA nesting sites are those areas that are least travelled, near water and in a more open setting such as agriculture fields, along fence lines, on the verges of roadways, water drains, dams, creeks/rivers/streams, etc. The ant does not enjoy a closed environment such as a forest or dense bushland however will likely establish in a clearing. Nests have been found under concrete slabs such as paths, but also large parking slabs where the ant accesses underneath via cracks, etc., on machinery with large soil build up and in electrical equipment such as ground level junction boxes, switch boxes, runway lights, etc., where they carry soil into these units (Scott-Orr et al. 2021).

Figure 2. (A) Red Imported Fire Ant (RIFA) nest above ground, (B) an alate (circled) with workers, and (C) a worker RIFA.

THE INDUSTRY

The nursery industry was the first horticultural industry significantly impacted due to the nature of the pest, past experience in other countries and the location of growers within the RIFA biosecurity zones established by Biosecurity Queensland. Many growers in the early days of the response to RIFA lost key customers in southern states, afraid they may get RIFA in consignments from growers in SEQ. Over the past 24 years there has not been a recorded movement of a RIFA nest in nursery stock from a professional production nursery, a testimony to the professionalism and diligence growers in SEQ have applied to meeting their biosecurity obligations.

The industry impact however has been significant with 20 plus years of a failed eradication program noting that the NFAEP claim great success in 'preventing the spread' of RIFA due to the ant not having spread as far as north of Mackay, south of Sydney and west of Cunnamulla **(Fig. 3)**. In fact, the program has been a significant failure, as noted above, expanding from 40,000 ha in 2005 to more than 800,000 ha in 2024, a 1,900% increase in infested area. During this period (2005 to 2023) the production nurseries in SEQ have had to manage this pest as the infested zone grew in diameter, collecting more and more growers, plus the increasing ant densities elevating the risk of infestation due to the failed eradication.

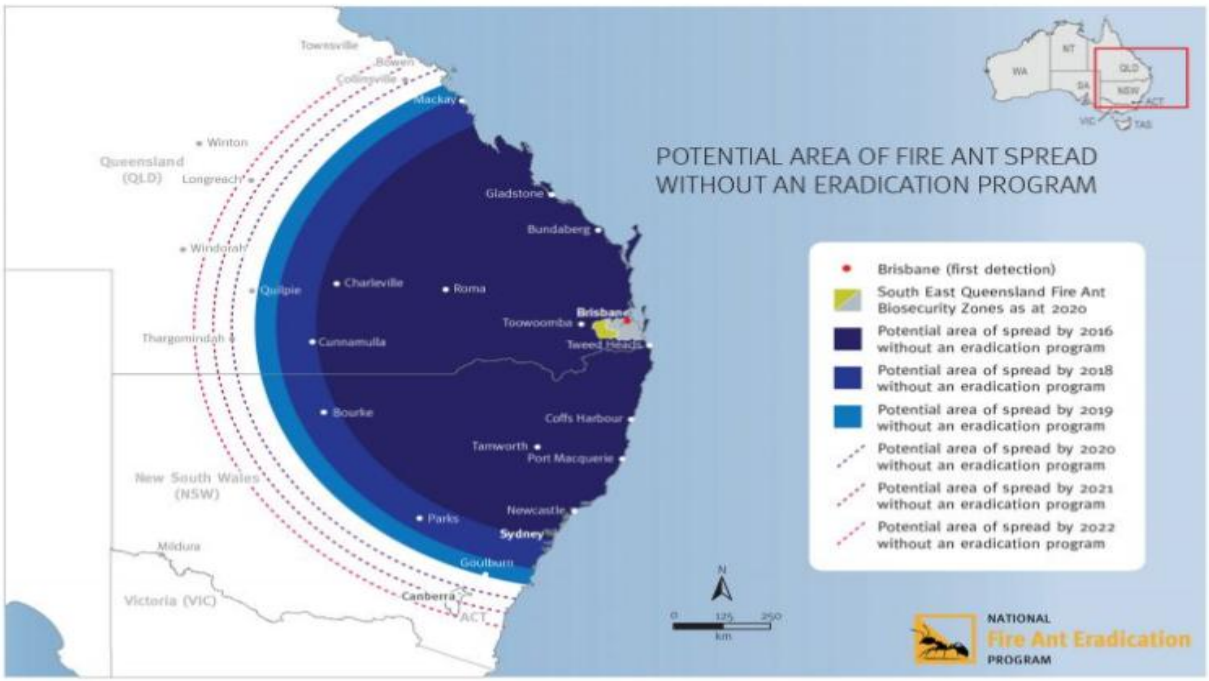

Figure 3. Potential RIFA spread based on NFAEP modelling without program. Source: National Fire Ant Eradication Program (2024).

It is important to note that the fundamental driver for the failure of the eradication program has been due to all state and commonwealth governments lack of action, priority setting, commitment and recognition of the seriousness of risk to Australia's way of life and our environment (**Fig. 4**). To not have an agreed comprehensive national eradication plan in place until 18 years into the detection of the RIFA incursion is telling of the massive failure in leadership. Of concern is that these same entities have been given clear advice on what is required to eradicate RIFA from SEQ, and the same response is delivered, with a $500+ million 5-year funding plan when the experts have said it will require this on an annual basis for at least 5years.

The production nursery sector in SEQ have had to bear the brunt of these poor funding and eradication decisions made by government and importantly, as this is a pest of the environment, it does not sit under the cost sharing Emergency Plant Pest Response Deed, nor the National Environmental Biosecurity Response Agreement (NEBRA), which allow governments to fall short of their obligations. The RIFA response is outside of any of the formal Deed arrangements therefore industry has very little say, that is no say at all, in how the response is funded and managed yet the grower impacts are severe and costly.

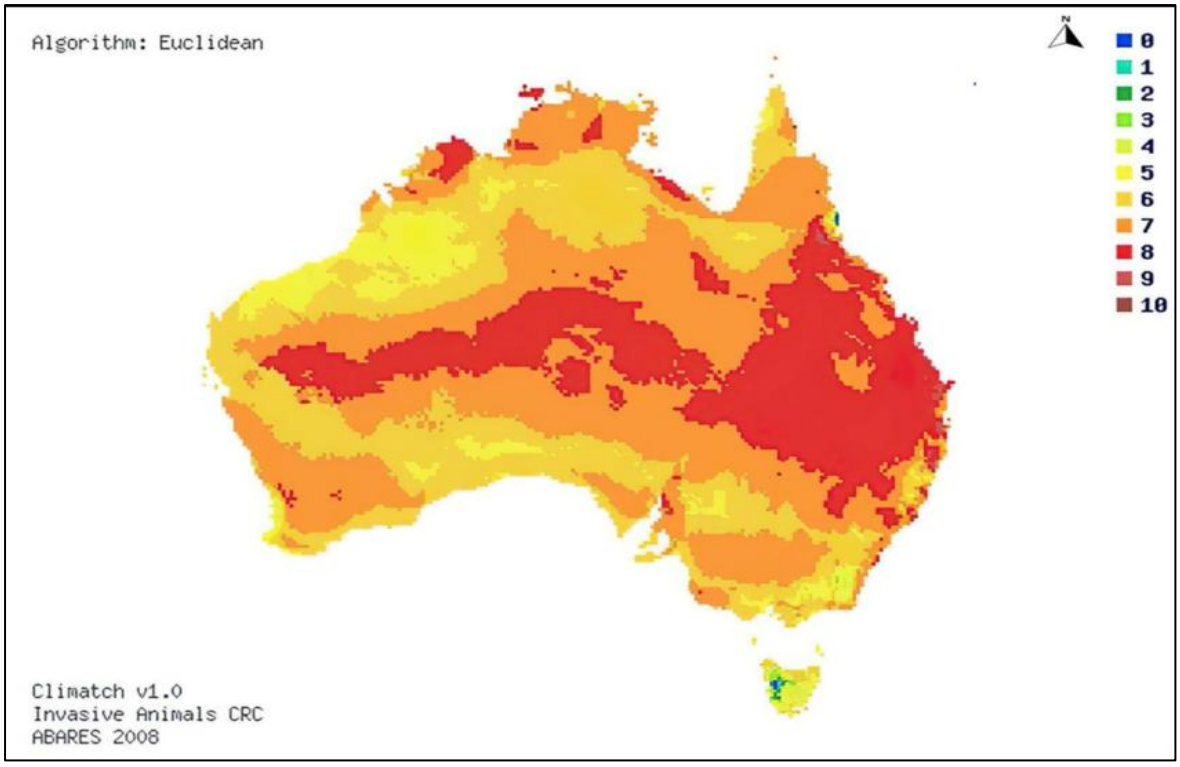

Figure 4. Suitable Red Imported Fire Ant (RIFA) habitat across Australia. Increasing scores represent increased habitat suitability for RIFA: Scores 0-4 (below threshold, or not suitable for RIFA habitat) and scores 5-10 (above threshold, or suitable for RIFA).

The RIFA incursion has, over the past 3 to 5 years expanded at a rapid rate both north and south of the Brisbane CBD. The northern boundary, at this point in time, is just short of Caboolture, with new detections coming almost weekly, and south to Currumbin Waters, 5km from the New South Wales border. This has added hundreds of new production nurseries to the list of Affected businesses that now must meet intra and/or interstate movement conditions. This impact on businesses is exacerbated by the lack of effort put towards suppressing the RIFA infestation within the RIFA Zone.

As the RIFA population within the zone increases in density, noting the eradication program only manages the outer edges of the infested area (**Fig. 1)**. Blue and orange zones), the greater the risk to production nurseries of RIFA establishing onsite or nearby which enhances the chance of RIFA infestations. This risk is also exposing the role all businesses in SEQ have in mitigating the risk of moving a RIFA Queen on a consignment of any good that may have been stored in the open and loaded onto interstate/intrastate transport. Unfortunately, those overseeing the eradication program have allocated very little funding to attend to this risk rendering it fundamentally ineffective in reducing overall risk, and industry is paying for this failure.

In 2006 the Nursery & Garden Industry Queensland surveyed growers in SEQ and established that annual RIFA costs to industry (lost markets, regulatory compliance, risk mitigation, etc.) exceeded $9 million per year. With the significant increase in area since then, more growers impacted, this cost per annum has grown exponentially now estimated at more than $20

million per annum in 2024. A significant factor in this increase, aside from more growers impacted, is the changed risk mitigation measure implemented under the Queensland Biosecurity Regulation 2016. The introduced mandatory cover or treat elements of the Regulation have seen growers in SEQ incorporate a granular formulation of the insecticide bifenthrin (e.g., MaxGuard 2G, Superway Bifenthrin, etc.) into growing media to give a maximum protection period of 2 years. The additional cost of incorporating bifenthrin, per m^3 of growing media, is approx. $20 which adds millions of dollars per year to the industry costs of managing RIFA.

MANAGEMENT

Currently in Australia we have the most disconnected RIFA interstate movement conditions since the detection 23 years ago due to regulators adopting poor science, outdated information, and cherry-picking information to suit off-loading regulatory administrative actions, etc. The NFAEP has been a poor source of data and at almost every independent program review has been criticized for the lack of research and data gathered over the almost quarter century of this incursion. Local data can better inform our decision making, assess risk, evaluate mitigation measures, etc., however very little of value exists in Queensland hence we see opinion dominate decision making which is costing the industry millions each year and a failed eradication program.

We have plant biosecurity regulatory institutions that are risk averse, while claiming they meet Australia's 'very low risk' Appropriate Level of Protection (ALOP), however it is obvious they are seeking 'zero risk' and relying on chemicals to achieve it. The 20 years (2001 – 2020) where we applied a 'Systems' Approach' to mitigating the risk of moving RIFA, through Approved Risk Management Plans, focused on property freedom, crop monitoring and dispatch inspections proved a most effective strategy in preventing the movement of RIFA in nursery stock. We can make this claim because there were no infestations/movement in consigned nursery stock recorded across Australia. Importantly, in support of the above claim, industry has produced approximately 5.5 billion plants in SEQ (Australian Horticultural Statistics Handbook 2022) over the past 20 years, moving an estimated 2 billion (35%) interstate (NGIQ unpublished survey 2020) presenting a significant sample size from which to draw, and have confidence in, our above statements.

CONCLUSION

As RIFA continues to spread, and governments cannot lead, we expect to see RIFA move into other Australian jurisdictions as we cannot see how the current program can succeed at a 10^{th} of the funding the experts say is required. This means that we will likely witness RIFA move at a similar rate to that we have seen in Queensland and continue to move further north further along the Queensland coast and south into New South Wales and onwards.

For production nurseries the message is clear, keep RIFA off your site and trade with businesses that are RIFA aware and have their own risk mitigation programs in place. Most production nurseries in SEQ are incorporating bifenthrin granular into the growing media however this does not prevent RIFA Queen's flying onto a palletised consignment such as we saw in

March 2023. Inspecting consignments is an important part of mitigating the risk of moving any plant pest and should be a standard operating procedure for any plant producer.

Property surveillance, crop monitoring and dispatch inspections have been more effective than a simple chemical treatment, particularly over the first 20 years of this incursion, as these were the mitigation measures that saw no RIFA movement in nursery stock from a production nursery. The NFAEP changed the RIFA regulation in 2016 to mandatory chemical treatment to save them an administrative activity (cancelled Approved Risk Management Plans) and placed all their eggs in chemical treatment. Since the removal of the inspection system a plant consignment in 2023 moved a Queen, not a nest, on pallet wrapping of a plant consignment from SEQ detected through the verification inspection upon arrival in Melbourne, Victoria.

There are a significant number of pest management resources available to industry including RIFA specific technical information plus a plant protection program (BioSecure HACCP) that provide all the guidance on surveillance, inspections and crop monitoring. Resources can be found here: https://nurseryproductionfms.com.au/

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