

Management Plan for Atafu

1	Purpose and approach	3
2	Scope and adaptive management	3
2.1	Scope	3
2.2	Progress recording and adaptive management	5
3	Communication Plan	8
3.1	Stakeholders	8
3.1.1	Roles and responsibilities of key stakeholders	8
3.1.2	Key messages	9
3.2	Community awareness.....	10
3.2.1	Key messages	10
3.3	Delimiting and baseline data gathering	11
3.4	Baseline data gathering	12
3.5	Environmental impact measurement	12
4	Surveillance and containment plan.....	12
4.1	Surveillance	12
4.1.1	Passive ant surveillance.....	12
4.1.2	Active ant surveillance	12
4.2	Movement controls.....	13
4.2.1	Reducing the risk of jump dispersal	13
5	Treatment and Monitoring.....	14
5.1	Treatment Standard Operating Procedures (SOPs)	14
5.1.1	Schedule for activities during treatment	14
5.1.2	Health and safety	15
5.1.3	Mitigation of social and environmental risks	16
5.1.4	Staffing requirements	17
5.1.5	Ant treatment materials	17
5.1.6	Pesticide application.....	19
5.2	Monitoring plan.....	24
5.2.1	Social monitoring.....	24
5.2.2	Environmental Monitoring protocols	25
5.3	Evaluation.....	28
5.3.1	Evaluate effectiveness of treatment	28
5.3.2	Review management plan.....	28
6	Acknowledgements	28
7	Appendices	30
7.1	Appendix 1. Warning poster for Antoff Fipronil treatment	30
7.2	Appendix 2. Tally sheet for visual monitoring.....	32
7.3	Appendix 3. Awareness poster for yellow crazy ants	33
7.4	Appendix 4. Material Safety Data Sheet (MSDS) for pesticides used	34
7.5	Appendix 5. Additional monitoring protocols	56
7.5.1	Pitfall trap instructions	56

7.5.2	Baited Vials (Pottles).....	57
7.5.3	Baited Tiles.....	57
7.5.4	Recording baseline and post-treatment data	59
7.6	Appendix 6. Health survey	60
7.7	Appendix 7. Record of outcomes of treatment and monitoring	65
7.7.1	June 2015	65
7.7.2	November 2015	84
7.7.3	December 2015.....	86
7.7.4	April 2016	89
7.7.5	May 2016	92
7.8	Appendix 8. Monitoring results.....	99
7.8.1	Management and monitoring 2015.....	99
7.8.2	Management and monitoring 2016.....	101

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1 Purpose and approach

The purpose of this management plan is to provide the essential information necessary to manage an established incursion of yellow crazy ants (*Anoplolepis gracilipes*) on a large scale (~ 70 hectares) in an inhabited semi-natural environment on Atafu. The information provided here is based on best practice and should be sufficient for guiding Atafu in the implementation of a yellow crazy ant management plan.

The goal of the management plan is to reduce the numbers of yellow crazy ants on Atafu within two years, followed by a three-year monitoring period. The management plan also provides a way to record the results of management activities and will be revised as needed depending on progress (adaptive management).

The plan incorporates the SPC General Emergency Response Plan for Invasive Ant Incursions 2008, and Environmental and Social Impact Assessment (ESIA). Documents referenced in the development of this plan can be found in the Acknowledgements.

2 Scope and adaptive management

2.1 Scope

The *spatial scope* of yellow crazy ant management plan for Atafu includes the entire village islet, as outlined in Figure 1. The first management treatment in June 2015 will be preceded by a delimiting survey. If the yellow crazy ant incursion is found to have significantly increased or decreased in size within the village islet, the management plan will be revised accordingly.

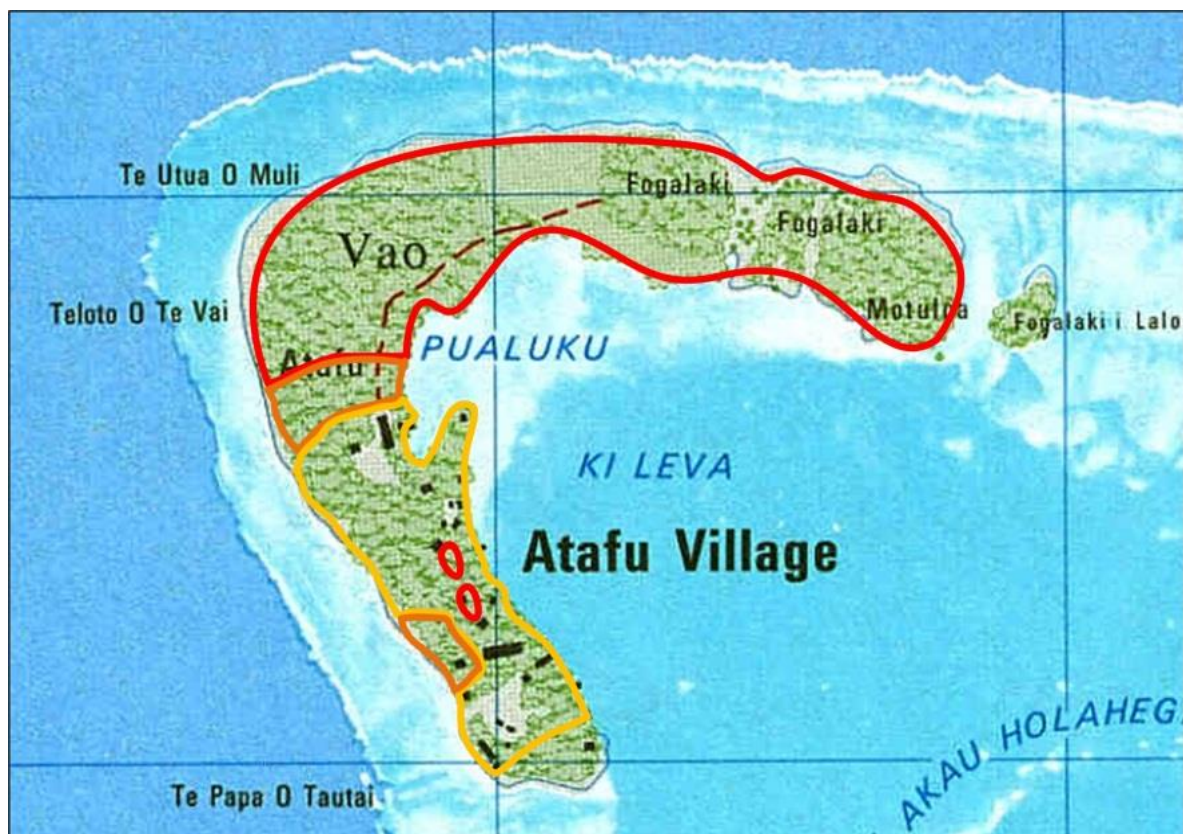


Figure 1: Distribution of the yellow crazy ant on Atafu islet in February 2014. Red indicates high abundance, orange medium abundance and yellow sparse abundance. The high yellow crazy ant density area covers approximately 40 hectares, and the remainder of the infestation covers approximately 30 hectares. In late 2014 the high abundance area above was more patchy, with mixed abundance and the ant was also found in more patches throughout the village area.

The *temporal scope* of management (timeline) is from June 2015 to December 2019.

Further detail on the spatial and temporal boundaries of management can be found in the ESIA.

The Management Plan will be executed over a five year period. Depending on the results of the first Monitoring exercise, these plans may be modified.

2.2 Progress recording and adaptive management

As the management activities progress, their outcomes will be recorded here, and changes incorporated into the Management Plan.

Table 1: Timeline of management activity on Atafu. It will be used to plot the progress of treatment and to record changes after re-evaluation of each step. Appendix 6 contains detail of each treatment and monitoring event, which is summarised here.

Date	Activity	Results	Outcomes
June – July 2015	Pre-treatment monitoring and Treatment	The entire village and vao area was treated with Antoff granular bait, supplemented by spot treatments of Vanquish-Pro and ATTRATHOR around the Pigsties and selected village buildings (communal kitchens, hospital, school etc.).	A noticeable reduction in YCA abundance was observed within three days of treatment. Post treatment monitoring will be undertaken in a follow up visit in October/November 2015 to confirm and quantify this reduction. Depending on the results of this monitoring follow up treatment may be initiated in October/November.
November 2015	Monitoring	This Activity was confounded when Pacific Biosecurity personnel arrived in Apia to discover that their place on the return sailing had been given away. It was suggested that the PB staff could make a return trip on the outward sailing, but as this would have afforded them just 1.5 hours on Atafu on a Sunday evening when the village rules state that no one is allowed to work, it was decided to return to New Zealand instead.	This highlights the sometimes insurmountable logistical issues involved in this programme. Upon PB's return to Wellington it was decided that Staff from Atafu should attend training in Monitoring in Apia before any further management decisions can be made.
December 2015	Monitoring, Ant Identification and follow up management training	Two EDNRE staff attended Five days' training in Apia. The training consisted of a combination of workshop presentations and outdoor simulations as well as practical instruction in safe handling of contact	Two EDNRE officers were trained in Monitoring protocols, Ant identification (including use of keys and microscopes) and safe handling and application of Fipronil baits. One of the officers will arrange for post

		insecticides	treatment monitoring to be done in January 2016. The results will be assessed by Pacific Biosecurity staff and the will be used to inform any future management.
March - April 2016	Post treatment Monitoring	<p>A team of five people led by Leuta Tamoia (Atafu EDNRE officer) monitored the entire Atafu village using a combination of visual surveys, attractive lures, pitfall traps and card counts. YCA distribution was found to be patchy and sparse and abundance was low. Most observations of YCA occurred either around household refuse or in the area of the vao near the pig sties.</p> <p>No evidence of non-target poisoning (i.e. larger than expected numbers of dead or dying fauna) was observed. However it should be noted that no fauna (alive or dead) was recorded on any of the ten transects</p>	<p>The findings of this monitoring survey indicate that abundance of YCA has fallen well below the accepted thresholds for ongoing management. Spot treatments of the refuse areas are advised and movement controls should be put in place to prevent the ants from being spread with the relocation of refuse.</p> <p>The pig sties appear to be the hub of the remaining infestation and it is advisable to treat them with a combination of Vanquish Pro and ATTRATHOR to ensure numbers remain low.</p> <p>Ongoing Monitoring at six monthly intervals is essential from now on to allow early response to increased numbers.</p> <p>The lack of fauna recorded in the post treatment monitoring transects should be examined further. Pacific Biosecurity will discuss this with Ms Tamoia in May, and the transects may be reassessed. However, as no dead animals of any kind were recorded it seems unlikely that the zero counts were the result of non-target poisoning.</p>
May 2016	Follow up Monitoring and Spot-treatment	The YCA appear to be at the same low abundance described in the March 2016 monitoring report. PB's observations in the	The indications of observations made during this trip in combination with the March 2016 monitoring report suggest that the June 2015

		<p>vao did not support the zero counts recorded in the post treatment survey. Skinks, hermit crabs and orb web spiders were abundant throughout the vao and black and brown ants (likely <i>Paratrechina longicornis</i> and <i>Pheidole megacephala</i> respectively) were obvious throughout the inhabited motu.</p> <p>Spot treatments were necessary in only a handful of areas, most notably a 0.5 ha strip of bush near the cemetery.</p>	treatment round reduced YCA abundance dramatically (~99%).
November 2016	Monitoring		
2017	Monitoring (3 events)		
2018	Monitoring (3 events)		
2019	Monitoring (3 events)		

3 Communication Plan

3.1 Stakeholders

The primary Stakeholders are:

- EDNRE officers based in Samoa
- Transport Agency (TSS) officers
- PB Matua and Lady Naomi captains and crew
- EDNRE officers in Atafu
- Taupulega members in Atafu
- The Office of the Council for the Ongoing Government of Tokelau (OCOG)
- Atafu villagers
- FBA Consulting

3.1.1 Roles and responsibilities of key stakeholders

Organisation and Role	Responsibilities
Pacific Biosecurity Activity Leader	<ul style="list-style-type: none"> • Undertake treatment and monitoring on Atafu • Ensure appropriate parties (Taupulega and villagers) are fully informed • Ensure all safety and mitigation measures are followed • Maintain professional practice • Report outcomes of monitoring • Comply with local law and cultural expectations • Ensure effective communication • Ensure that logistic requirements are met
FBA Consulting Treatment provider for Atafu	<ul style="list-style-type: none"> • Undertake treatment on Atafu according to best practice pest control • Meet all safety requirements • Train local workers to assist with baiting • Ensure local workers meet safety expectations • Report to Pacific Biosecurity • Maintain professional practice • Comply with local law and cultural expectations • Ensure effective communication • Ensure that logistic requirements are met
EDNRE and Taupulega Representatives from all three atolls Support Activity on Atafu In-country logistics and liaison	<ul style="list-style-type: none"> • Ensure staff participate in treatment and monitoring • Ensure staff receive training • Undertake monitoring independently (Years 3 – 5) • Ensure Taupulega and community owners informed • Comply with the safety guidelines • Adhere to the instructions given by Pacific Biosecurity and FBA • Participate in treatment and workshops • Raise concerns with appropriate parties • Report concerns to Pacific Biosecurity • Ensure effective communication • Ensure that logistic requirements are met
Villagers Provide labour for treatment and monitoring on Atafu	<ul style="list-style-type: none"> • Comply with the safety guidelines • Adhere to the instructions given by Pacific Biosecurity and FBA • Participate in training and treatment • Raise concerns with appropriate parties

	<ul style="list-style-type: none"> • Report concerns to Pacific Biosecurity, EDNRE
Taupulega and other villagers	<ul style="list-style-type: none"> • Support the Activity • Comply with the safety guidelines • Raise concerns with appropriate parties • Report concerns to Pacific Biosecurity

3.1.2 Key messages

To ensure minimal disruption to daily life and maximum reduction of risks associated with insecticide treatment, affected stakeholders will be briefed prior to beginning of treatment. These risks include:

- Human exposure to toxins in Antoff bait – no effects have previously been reported in association with the Antoff granular bait being used in this management. However, exposure to large quantities of the active ingredient Fipronil, have been associated with the following symptoms: excessive sweating, nausea, vomiting, head ache, stomach pain, dizziness, weakness, seizures. There is one known case of a fifty year old man who sprayed fields with Fipronil for about five hours and complained of headache, nausea, weakness and dizziness. The symptoms emerged after about two hours and went away by themselves. Post treatment monitoring of participants and stakeholders will be put in place for early detection of any symptoms. Disruption of village life – most if not all of the village will take part in ant management activities during treatment, so it is likely that there will be significant disruption to village activities. Non target poisoning (domestic animals and wildlife) – Fipronil is toxic to a wide variety of beneficial invertebrates including crabs. Animals and birds are unlikely to be affected as the bait contains extremely low concentrations of poison (0.01g/kg). However caution should be exercised in allowing domestic animals (such pigs) to roam freely in the treatment area, including the pigsty.
- Contamination of water or lagoon - Fipronil is highly toxic to fish and marine invertebrates such as crabs. However, the poison will not be applied near open water or when rain is expected in order to minimise any chance of run-off.

The briefing outlines ways to reduce risk from the treatment of ant infestations with Antoff baits. This includes:

- Appropriate personal protective equipment (PPE) will be distributed to everybody involved in the Management Programme. The bait is a solid pellet and will be distributed using mechanical spreaders and bait stations filled using scoops. Therefore, nitrile gloves (plus earmuffs and dustmasks for blower operators) are the only PPE deemed necessary for this operation.
- In addition to briefing all stakeholders, warning posters in both English and Tokelauan will be distributed around the village.
- Timeline of management activity- it is anticipated that Pacific Biosecurity, FBA, EDNRE and the villagers involved in the Management Plan will be moving constantly around the village. The application of bait will take a maximum of seven days. However, other activities such as workshops, and delimiting and monitoring surveys will happen over the course of the treatment.

3.2 Community awareness

To limit the spread of yellow crazy ants and inform about the potential risks associated with the use of pesticides, awareness materials will be distributed to villagers.

The successful implementation of the yellow crazy ant management plan in Atafu is only possible if Pacific Biosecurity, FBA, local officers, villagers and the Taupulega work together and communicate effectively. In particular, the Taupulega and EDNRE officers play an important role in this process as they are the main link between Pacific Biosecurity/FBA and the villagers.

The key contacts are:

- EDNRE (Mika Perez and Menny Tavuto);
- Transport and Support Services (Asofa Fereti and Taufau);
- Pacific Biosecurity (Monica Gruber, Allan Burne and Rafael Barbieri)
- FBA consulting (Vivienne Van Dyk).

3.2.1 Key messages

The key messages that need to be conveyed to villagers are:

- What the pest is - a clear description of the yellow crazy ant accompanied by photographs. Give some information about the ants' biology particularly the need to kill queens rather than workers in order to destroy nests
- Why it is a problem – detailing the environmental (death or displacement of native birds, lizards, crabs and as well as other invertebrates), Economic (the ants "farm" mealybugs, whitefly, aphids and other pest insects, which reduce crop quality and yield and the ants' disruption of roots leading to plant death) and social (the ants are a nuisance in large numbers, disrupting everyday activities, biting, spraying acid and its association with secondary infections).
- How the ant spreads – an outline of the high risk pathways for the ants to spread, including: rubbish, plant material, passengers and their belongings, timber and machinery.
- Prevention is better than cure! Stress that anything being moved from a high risk area is checked or treated before departure.

Before the implementation of any activities, stakeholders will be alerted of any hazards associated to this plan, which involve the use of toxic baits to control yellow crazy ants. The risks of this baiting program will be discussed with villagers.

The major concerns pointed out by Atafu villagers and the Taupulega regarding this ant management programme are the indirect impacts of the insecticide Fipronil on non-target animals and people.

The following steps for operational communication will be adopted:

- Effective communication to gain support by the villagers. Before undertaking any treatment, Pacific Biosecurity will discuss and agree communications and key messages to the affected parties.
- Communication materials, including pamphlets, brochures, signage and information sheets will be produced by Pacific Biosecurity in plain English and translated to Tokelauan.

- Issues relating to non-acceptance (i.e., villagers who do not want pesticide applied in their homes or gardens) will be reported to Pacific Biosecurity and EDNRE and discussed with the Taupulega for appropriate response within the treatment time frame.
- Before beginning treatment, Pacific Biosecurity and FBA will discuss with villagers how it will proceed and clarify the potential risks of pesticide exposure.
- Throughout the treatment period, villagers will be informed on the importance of containing pigs and other domestic animals into restricted areas to avoid these animals ingesting the toxic baits (Antoff containing Fipronil) used to control ants.

The following instructions will be circulated to the villagers:

- Antoff contains Fipronil. Fipronil is an insecticide used to control ants and many other insects. Granular Antoff baits containing Fipronil will be applied along Atafu over the next few weeks.
- Fipronil kills the ants when they eat it or come in contact with it. Fipronil is very toxic to insects, fish and other marine life and may be toxic to people and other animals if ingested in VERY LARGE QUANTITIES.
- Keep children away from baits and bait stations.
- Keep animals such as pigs away from baited areas.
- If you see bait granules on the ground or into bait stations attached to the trees and houses, PLEASE DO NOT TOUCH.
- If you touch the baits or the bait stations, please wash your hands thoroughly with soap and running water away from the lagoon. This is important to avoid Fipronil exposure.
- The possible symptoms of acute Fipronil exposure are: excessive sweating, nausea, vomiting, headache, stomach pain, dizziness, weakness, and seizures.
- If you feel one or more of these symptoms or wish to discuss a pesticide problem, please contact one of the EDNRE officers or Pacific Biosecurity staff.
- Pacific Biosecurity will be undertaking health surveys during treatment

3.3 Delimiting and baseline data gathering

In order to implement an effective management plan and contain the spread of yellow crazy ants, it is essential to first determine the baseline limits of their distribution.

The yellow crazy ant was first detected on Atafu in 2008, at the fuel depot. By 2012, the ant was in high density throughout the *vao* area, reaching to the pigsty, as well as the village area. A further assessment (February 2014) indicated high infestation levels in the village area (Figure 1), but the number of yellow crazy ants was lower than in 2012. The yellow crazy ants currently cover almost the entire islet, with only about 50m at the southern side of the village being apparently free of yellow crazy ants (Pacific Biosecurity visual survey on November 2014).

The Management Plan is based on the results of these delimiting surveys, which now show ants to be present in varying densities across most of the of the islet. Therefore, the infestation will be treated as being effectively contiguous and the entire islet will be baited.

3.4 Baseline data gathering

Card counts are a quick way of establishing yellow crazy ant density. The full methods for this technique are presented in the Monitoring plan (Section 5.2.2.2.) below, but basically this involves counting the number of ants crossing a square of white card in a 30 second period.

3.5 Environmental impact measurement

In order to check for non-target poisoning any crabs, spiders or insects on the ground other than ants and birds encountered during the visual survey will be quantified. It is not important to identify what is encountered. Just make a tally of the number of each encountered on the sheet provided (Appendix 2).

4 Surveillance and containment plan

4.1 Surveillance

Ongoing surveillance is essential to catch incursions early before they become a bigger and harder problem to manage. However, surveillance can require a lot of resources, particularly in terms of peoples' time. Below are some simple low-cost actions that can identify incursions in their early stages. Other Monitoring protocols are presented in Appendix 5.

4.1.1 Passive ant surveillance

Surveillance capability can be increased by engaging the community. Posters, public talks and word of mouth can be used to raise general awareness of potential threat species. An example poster is included in Appendix 3. The poster should:

- State what the threat is
- Have a clear photograph of the threat species
- State why it is a pest
- State the possible consequences of establishment
- Give clear instructions who to report any sightings to

Posters should be placed in high risk (e.g. on the boat, in the TALO offices in Apia), as well as community gathering places. It is important to have a centralised group or individual that people can report their sightings to and for these reports to be investigated promptly and for feedback to be given to the reporter.

The biggest advantage of visual surveillance is the facility to incorporate it into villagers' everyday life. As soon as people know what they should look for, each person becomes a potential inspector.

4.1.2 Active ant surveillance

When undertaken periodically visual surveillance of high risk and high value areas is the most cost effective means of actively monitoring for yellow crazy ants. The boundaries of the area of interest should be established and it should then be searched in its entirety paying particular attention to:

- Fruit trees, flowering plants or other food sources
- Sheltered or damp areas such as clumps of grass

- Under debris and easily moved stones.

At low densities yellow crazy ants may be difficult to observe. Use of sugar lures (a ball of cotton wool soaked in sugar water every ten metres will aid in discovery of any smaller populations of yellow crazy ants.

A list of important active surveillance actions are:

- Officers to run Visual Surveillance on every cargo item moved from Apia and from any other islands into Atafu.
- Officers and villagers should inspect any material transported between islets and over the entire Atafu atoll.
- Officers should periodically walk systematically over the entire village and visit the islets looking for yellow crazy ants or other ants that seem to be a problem. If an ant or a colony is found, DO NOT DISTURB THE ANT COLONY. Yellow crazy ant colonies may move after disturbance, which makes them more difficult to control.

If one finds a yellow crazy ant colony, record the location where the yellow crazy ant was found. By doing so, the site can be re-visited for further investigation and control. One may want to place a landmark close to the place where the YCA was found. For example, a colourful plastic bag or a piece of rope well tied to a coconut tree – these would be easily found. Additionally, take any information that could facilitate further investigation. For example, if one found ants close to a breadfruit tree located behind the church, take note of this information

4.2 Movement controls

A proactive strategy with a pre-movement focus is crucial to contain the spread of yellow crazy ants on Atafu. Ideally, the vast majority of movement risks should be eliminated before any cargo arrives on Atafu. Such an approach would significantly decrease the likelihood of more ants arriving and/or spreading over new areas.

There are two parts to the containment of ants: restriction of natural spread and reducing the risk of jump dispersal.

4.2.1 Reducing the risk of jump dispersal

The greater risk of spreading ants is via jump-dispersal associated with human transport. The first step required for reducing the risk of jump-dispersal is the identification of the high-risk pathways for transporting ants *out* of infested areas.

The movement of people and goods from Apia to Atafu, and from Fakaofu and Nukunono to Atafu, increases the risks of introducing new non-indigenous animals and facilitate the spread of yellow crazy ants.

Importantly, the movement of coconuts, wood, soil and goods between Atafu islets and from one side of the village to another can also contribute for the establishment success of yellow crazy ants.

All members of the community must have a positive quarantine culture and are required to understand the importance of effective biosecurity systems and movement control in their day-to-day lives.

The potential pathways by which ants could jump-disperse throughout the village are any material transported by villagers, including: fruits, vegetable, vehicles, coconuts, tyres, construction material, boat, gear, rubbish and tools. Therefore, Atafu should implement a sequence of barriers of quarantine protection and quarantine procedures to avoid this dispersal.

At the border, including on boats moving cargo between Fakaofu, Nukunonu and Atafu, and within islets in Atafu, officers and villagers should rigorously inspect all cargo to ensure that the pre-border intervention is effective and that the cargo is yellow crazy ant free. For example, if a cargo of coconuts is transported from Fakaofu to Atafu it should be inspected and cleared by an officer. In the same way, if coconuts, compost, rubbish, plant parts, or any other debris are transported from an islet to the village, the cargo should be also inspected. If any non-indigenous species are found the cargo should be impounded and not released until the organism has been destroyed.

5 Treatment and Monitoring

The Treatment (Year 1-2) and Monitoring (Year 3-5) plan will be executed over a five year period and will be reviewed annually to establish whether baiting protocols need to be modified. Table 2 outlines the current plan for treatment. Depending on the results of the first Monitoring exercise, these plans may be modified.

Table 2: Approximate timetable of treatment and monitoring activities, based on treatment activities occurring in the dry season in Atafu. **Red / Bold** text indicates Pacific Biosecurity and in-country staff undertaking treatment / monitoring. *Green / Italics* text indicates in-country staff independently undertaking monitoring. Years are from June to May.

Years 1 – 2			Years 3 – 5		
June	November	March	June	October	December
Treatment	Monitoring	<i>Monitoring</i>	Monitoring	<i>Monitoring</i>	Monitoring*

*In year 3, Pacific Biosecurity will also implement social monitoring (see section 5.2.1.2)

5.1 Treatment Standard Operating Procedures (SOPs)

5.1.1 Schedule for activities during treatment

These are the general activities required during the first round of treatment. The actual activities, their outcomes and any issues are recorded in Appendix 7, which are summarised in Section 2.2.

Day 1.

Meet with Taupulega to discuss the Management Plan and treatment activities for the treatment or monitoring period on Atafu.

Communication with stakeholders.

Warning signage placement.

Pacific Biosecurity start Pre-Monitoring Survey.

Day 2 - 3.

Pacific Biosecurity resume Pre-Monitoring Survey.

Commence first treatments on southern areas and village buildings.

Day 4.

Pacific Biosecurity finalise Pre-Monitoring Survey.

Continue treatments around village areas.

Day 5.

Complete treatments around main village areas and buildings.

Start treatments in vao areas nearest village.

Days 6 - 8.

Continue treatment in main vao areas.

Day 9 - 10.

Complete treatments, including follow-ups in heavily infested areas.

Day 11.

Distribute Health Survey.

Discussions with stakeholders.

Return to Apia from Atafu.

5.1.2 Health and safety

Any activity that distributes chemicals in the environment involves risks that that must be clearly identified and managed.

The active ingredient being used in this treatment is Fipronil, an insect neurotoxin. The toxin is in low concentration in fishmeal based attractant bait called Antoff. Because of this low concentration, the Australian Work Safe Standards has classified the bait as non-hazardous to human health. However, as a precaution all participants in this treatment will be issued with the following personal protective equipment (PPE):

- Nitrile gloves

All participants are encouraged to wear long sleeved shirts, closed shoes and long trousers to minimise risk of any skin contact with bait. Other PPE for use with motorised blowers would include dust masks and ear muffs.

Key messages related to Antoff bait containing Fipronil:

- Fipronil may be harmful if swallowed, inhaled or absorbed through the skin. Fipronil may cause damage to the nervous system from repeated oral exposure at high doses. However, the yellow crazy ant management programme will apply baits containing very small doses of the insecticide Fipronil (0.001% or 0.01g of the active ingredient per Kilogram of bait).
- Antoff (pesticide) will be kept out of reach of children and while using the baits staff shall not eat, drink or smoke. In the literature no ill effects on humans have been reported through use of the Fipronil.
- Risks to human health will be mitigated by fully communicating these risks to the community, placing restrictions on food harvesting (withholding periods), close supervision of children, and following all safety precautions during bait application.
- If it is suspected that health effects are occurring during the implementations of this Management Plan, Antoff bait treatment may be discontinued at the discretion of the community.

- After the treatment is completed there will be an exit health survey. This survey will be confidential and is designed to ensure that any adverse health effects of bait use will be detected early and can be dealt with appropriately. No health effects are expected.

Key precautions regarding the use of Fipronil:

- Any insecticide, including Fipronil, must be applied as per specific procedures in technical information sheets.
- Minimize bait waste (toxin release) and maximize bait effectiveness by following the guidelines described in the treatment section (below).
- Follow product label instructions, MSDS (Material Safety Data Sheet) and any other factsheet provided by Pacific Biosecurity, FBA and EDNRE containing information regarding the correct use of Fipronil baits.
- FBA health and safety standards will be adhered to by villagers and any other staff participating on the baiting programme.
- At the end of each baiting session and before meals, remove protective gloves and wash hands. Then, wash face with soap and clean flowing water.

5.1.3 Mitigation of social and environmental risks

The following actions will be taken to minimize social and environmental risks related to the baiting programme:

- DO NOT apply the bait if rain is expected over the next 12 hours.
- To minimize non-target effects the bait is being distributed in the dry season and will not be spread on ground less than five metres away from any open water (i.e. the lagoon or ocean shore)
- Around houses and at the pigsty, bait shall not be applied on the ground level, but distributed in biodegradable conical bait stations.
- Bait stations will be attached to trees to keep them away from children
- To minimize the risk of bait being tampered with by young children, bait stations on trees will be set at a minimum height of 1.5 metres.
- Notification of treatment all residents of Atafu will be notified and provided with a copy of treatment information factsheet as well as health and safety instructions.
- If landowners are not present at the time of application, a notice will be left explaining that toxic baits have been applied along with a treatment factsheet attached.
- In the event a landowner does not consent to the application of toxic baits, Pacific Biosecurity will clarify that the yellow crazy ant baiting programme is necessary and notify the local officers.
- Any concerns raised by villagers regarding the baiting programme will be addressed by providing them with a treatment factsheet and referring them to Pacific Biosecurity and local EDNRE officers.

Exemption of properties from insecticide applications:

- Exemption from the baiting programme will be discussed with Pacific Biosecurity and EDNRE and the Taupulega, for consideration of alternative actions that do not compromise the management programme.

Withholding Periods for crop harvesting:

- Withholding period means the minimum period that should elapse between the last application and harvest of a treated crop before human or animal consumption.
- There is no withholding period listed for any granular products containing Fipronil. However, there are withholding periods for liquid sprays containing Fipronil, which are directly applied to plant foliage. Currently approved withholding periods vary from 7 – 42 days, depending on plant species.
- Given the lack of information regarding specific withholding periods for each of the crops on Atafu, a generic 42 day withholding period applies, as follows: ***Do not harvest any crops and fern shoot from the vao for 42 days after the last application of Fipronil baits.***
- It is important to note that Fipronil in the form of Antoff granular bait is considered to be very low risk in terms of secondary or indirect poisoning effects in humans or livestock.
- Granular bait is unlikely to transfer the active content Fipronil into plants through dermal contact with leaf surfaces.
- Fipronil exhibits low mobility in soil and moderate systemic action. Therefore, it is unlikely Fipronil to be transferred into plant tissues.

5.1.4 Staffing requirements

In Year 1 treatment will be undertaken by Pacific Biosecurity (Rafael Barbieri and Allan Burne), FBA (Viv Van Dyk; Brett Rawnsley and four other FBA staff), EDNRE officers (about 8 people), and a team of 20-30 villagers. In Year 2 it is anticipated that Pacific Biosecurity will assist EDNRE officers and Atafu villagers with treatment.

Participants will be split into small teams. Each team will comprise:

- one or more persons operating a bait spreader
- one or more spreader support people carrying the bait
- one supervisor

Bait station teams will comprise:

- one or more bait station installers
- one or more bait station support people to carry bait
- one supervisor

Specific roles and personnel will be allocated on the day of the activity.

5.1.5 Ant treatment materials

5.1.5.1 Pesticide descriptions

A copy of the Material Safety Data Sheet for each product can be found in Appendix 4.

5.1.5.1.1 Antoff® bait

Antoff® bait will be used for the control of yellow crazy ants. This ant bait has been designed to control yellow crazy ants and some other ant species.

The active ingredient in the bait, Fipronil, is a slow acting poison that works on the ants' nervous system. The bait is in granular in form (Figure 2a) and will be distributed using two different techniques: granular bait spreaders and bait stations (Figure 2b). Bait will be applied using one method or another in the majority of areas of Atafu.

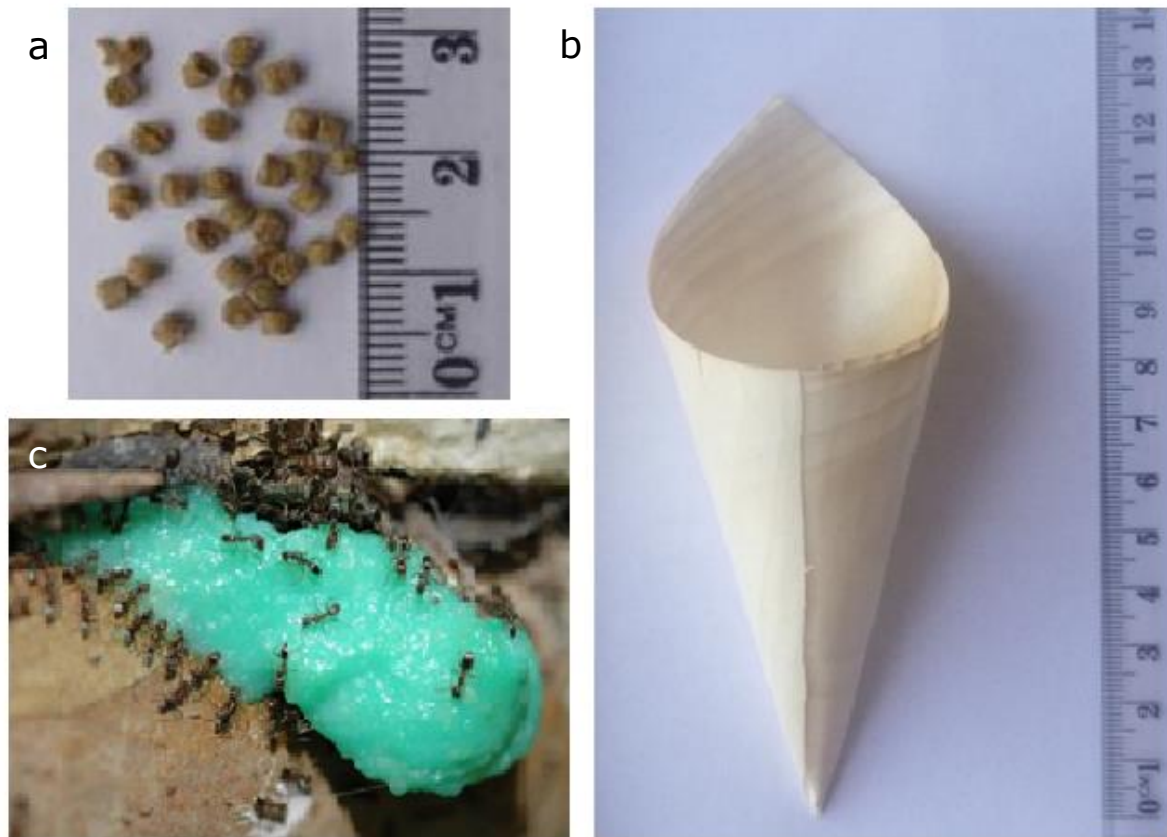


Figure 2: Antoff bait granules (a), tree/fencepost bait station (b) and ground bait station (c).

It is important to note that ants typically find the bait granules on the ground or into the bait stations while looking for food. The bait granules are then carried back to their nest and other ants are also contaminated with the insecticide Fipronil.

Sensitive areas, such as around the houses and the pigsty, will be targeted by using bait stations only. Because baits are contained in the bait stations and not easily accessible to children and domestic animals, this approach will systematically reduce risks of non-target exposure.

During the baiting activity, local officers and villagers will be trained to enable completion of the treatment should it take longer than estimated or perform additional baiting activity if required.

5.1.5.1.2 Vanquish-Pro or Xstinguish

Where granular bait is inappropriate because it might be handled by small children or eaten by domestic animals, targeted baiting will be employed. Vanquish-Pro or Xstinguish Fipronil based paste baits, will be used in exterior areas such as the outer walls of the pigsties. These baits take the form of a green paste (Figure 2c), similar in consistency to toothpaste. The paste is distributed in small quantities at three metre intervals in well-hidden spots such as crevices found in brickwork or under window sills of domestic or commercial structures.

5.1.5.1.3 ATTRATHOR

For building interiors and areas where it is possible dried paste or granular bait could be consumed by domestic animals, ATTRATHOR, a targeted contact bait, will be used. ATTRATHOR is supplied as a milky white liquid concentrate containing two components - an attractant and a toxicant (Fipronil) each bound in gel-based micro-capsules. The ATTRATHOR concentrate contains 2.6 g Fipronil/litre. It must be stored in a secure area away from drains that open on to the lagoon or into the sea.

The concentrate is diluted with water at a rate of 10ml of ATTRATHOR per litre of water and is applied using a standard hand held plant watering bottle. Once the water has evaporated, an invisible film of ATTRATHOR is left behind. This film is attractive to ants and the Fipronil toxin is picked up by the ants when they walk over it.

5.1.6 Pesticide application

5.1.6.1 Antoff® bait

Granular bait spreading will be done using both motorised and hand operated spreaders. Field teams composed of one FBA staff member, Pacific Biosecurity staff and three or more trained villagers will apply the baits evenly to all targeted areas.

- In the vao and vegetated areas, baits will be applied at a base rate of 10Kg/ha. In areas of high infestation an additional application may be required.
- Granular baits will be spread evenly on the ground using the spreaders.
- The spreader operator should cover the entire infested area.
- DO NOT apply bait using hand/motorised spreaders within 5 meters of waterways, around buildings and in the pigsty. For these situations use bait stations (see below).

5.1.6.1.1 Hand held spreaders

These will be supplied by FBA consulting. The spreaders feature:

- a hopper for holding the bait
- a winding handle that agitates the bait and scatters it over the ground
- an adjustable opening that is used to control the amount of bait that is spread.

With the aperture set at "3" (see Figure 3), the operator winds the spreader handle while walking at a normal pace. The swath width (where the bait is spread) will be approximately 2 metres. Application is undertaken by walking in transects in the areas to be treated, spreading the bait evenly. When a boundary is reached, the operator turns and walks back the other way so that the new swath overlaps the previous one by about half a metre.

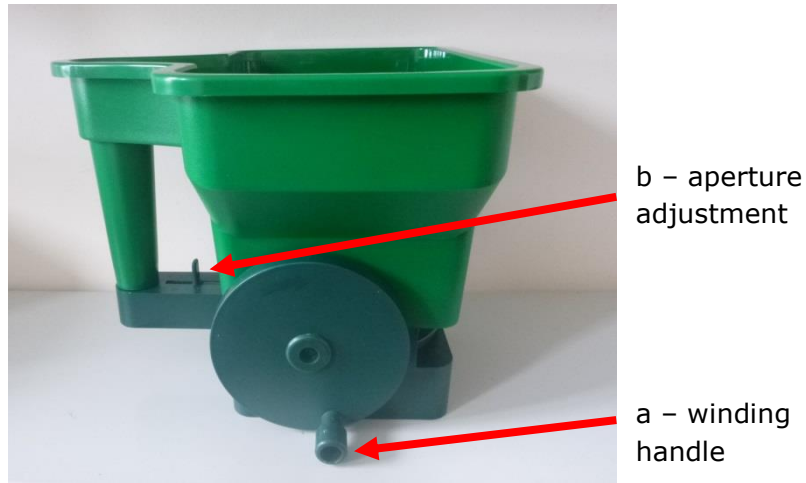


Figure 3: Hand held bait spreader of the type to be used, showing the winding handle (a), the aperture adjustment (b). The aperture should be set at “3”, but may require adjustment to ensure appropriate flow of bait for the terrain and speed of distribution.

When multiple operators are treating the same area, they form a line along the boundary of the treatment area. The operators should be spaced approximately 2.25m apart. An easy way to check this is for each operator to hold their arms out parallel to the ground whilst holding a spreader in one hand. There should be about 30cm between the spreader and the tip of the next operator’s fingers (Figure 4).



Figure 4: Environment officers check their spacing before commencing bait spreading. Officers are spaced two arms lengths plus the width of one spreader apart. This ensures that the swathes of bait from each spreader overlap.

As the operators move through the treatment area it is important that they remain in a straight line and move at a uniform pace as they pass from one end of the treatment area to the other. By maintaining equal spacing between operators and moving at an

even pace it is possible to ensure that the entire treatment area is well covered with bait.

When the boundary is reached, the innermost operator in the treatment area turns around (180 degrees) and steps 2.25m further into the treatment area. The remaining operators regroup around the innermost operator and move back through the next segment of the treatment area. (Figure 5).

Staff will be trained and applications audited to ensure the correct amount is dispensed in all areas (10kg/ha). Staff will be trained to adjust distribution depending on terrain, movement speed and vegetation densities to maintain a 10kg/ha application rate.

Always make sure that:

- Bait is spread evenly
- The swathes overlap
- The spaces between buildings are covered
- No bait is spread within 5 metres of any open water
- No bait is spread within 5 metres of a residential building

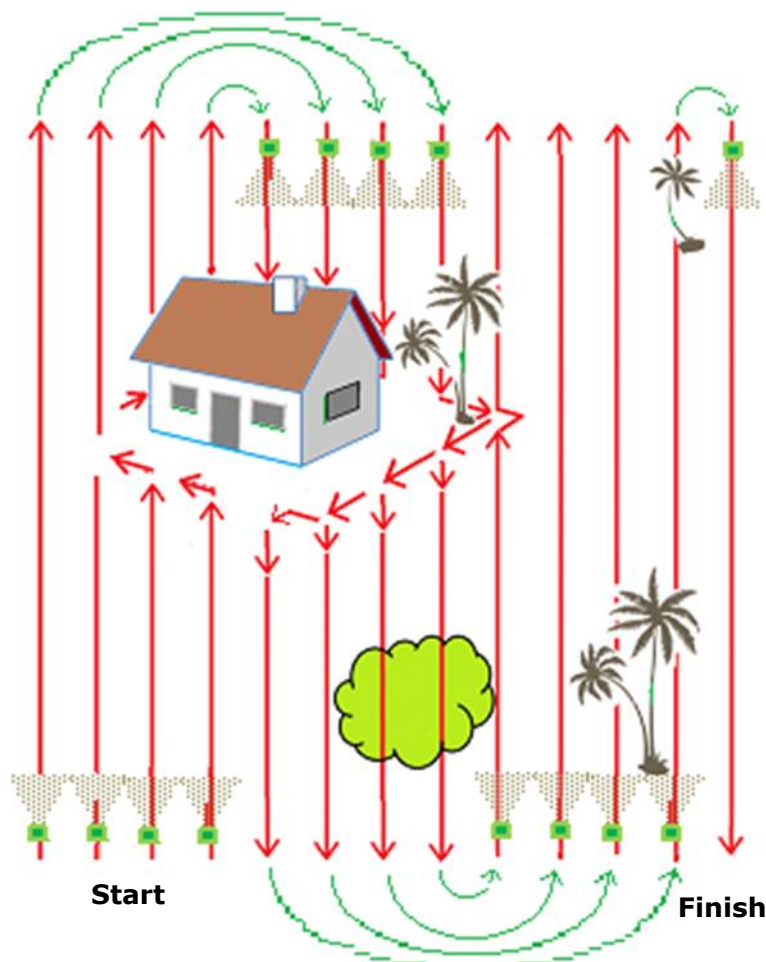


Figure 5: Example of a treatment path taken by four operators treating around an urban structure. The operators are spaced approximately 2.25m apart, and move as a group from one end of the treatment area to the other. The 2.5m swaths of bait overlap ensuring that the entire area is covered. The swath of Antoff bait on the return

sweep (Brown dotted triangle and green box) should overlap the swath of the outward sweep. The green arrows show the pattern used for turning the group around. Where obstacles are encountered the operator moves around them taking note of their position. These areas will subsequently be treated with other baits such as Vanquish Pro or ATTRATHOR.

5.1.6.1.2 Measuring bait use

It is important to measure the amount of bait being distributed. This can be achieved by measuring the amount of bait used in each spreader and the area treated.

Each spreader comfortably holds 1 kg of Antoff Bait. Use a 1litre measuring jug / cut off water bottle to fill the spreader; 750ml of AntOff bait equates to approximately 500g, so two 750ml scoops will fill the spreader with 1kg of bait.

The spreader creates a swathe of bait approximately 2.5 metres in diameter. At the optimum distribution rate of 10kg/ha, one spreader load should cover four 100 metre tracks (measured by GPS or paces*).

If the spreader is empty before you have covered this area, reduce the aperture size and / or increase the speed at which you are covering ground.

Conversely, if there is still bait left after four 100 metre tracks consider increasing the aperture size and / or moving more slowly. In this case you should revisit the treatment area and supplement the bait already spread.

5.1.6.1.3 Motorised blowers

These will be supplied by FBA. The blowers feature:

- a tank for holding up to 10kg of bait
- a 2 stroke petrol engine that blows air at variable speeds
- an application nozzle that can be used to aim bait in an arc of 90 degrees left and right or up and down, and to dispense bait out to a distance of approximately 7-8 metres if needed.
- an adjustable lever to regulate flow of bait through nozzle

Blowers will be used to apply granular bait in areas of heavy and/or impenetrable vegetation where hand spreaders are impracticable. Blowers can also be used to distribute bait up into tree canopies where arboreal ant nests are suspected to be located (e.g., in heavily infested areas).

Blowers will only be used by FBA staff or competent island staff following training and with close direct supervision.

5.1.6.1.4 Bait stations

Bait stations will be attached to coconut palm trees, woody vegetation and structures where appropriate. The granular bait is then placed inside the bait stations and not directly on the soil. Field teams composed of one supervisor and other staff will monitor and refill the stations as needed.

- Nail the station on a tree or woody plant ensuring above 1.5 metres above the ground
- Fill up bait stations using the scoop provided (one scoop per bait station)

- DO NOT fill up bait stations to its maximum limits as bait granules may fall on the soil surface
- Place bait station approximately 5 metres apart where possible
- If ants carry all granular bait back to their nest, then the bait station will be re-filled until ants are no longer seen carrying bait.
- No top-up is necessary if there is granular bait in the station when the team returns to inspect the bait station
- Each field team will record bait station locations (using GPS and landmarks) and the number of times the station was topped up.

5.1.6.2 Vanquish Pro/Xstinguish

Vanquish Pro/ Xstinguish is a green Fipronil based bait (Figure 3c) that is applied as a paste from a sealed syringe-like cartridge. A “blob” of bait approximately the size of a fingernail is applied to vertical surfaces or into cracks or crevices around buildings or on trees. Application of the paste should be spaced at approximately 3 metre intervals, where ants forage.

Like Antoff, Vanquish Pro/Xstinguish contains a very low concentration of Fipronil (0.1g/kg) and it is unlikely that a child could consume sufficient volume to have any toxic effects. However, the bait should be applied at heights greater than 1.5m to minimise the risk of younger children or roaming animals interfering with it.

5.1.6.3 ATTRATHOR

ATTRATHOR is supplied as a milky white liquid concentrate containing two components - an attractant and a toxicant (Fipronil) each bound in gel-based micro-capsules. The ATTRATHOR concentrate contains 2.6 g Fipronil/litre. It must be stored in a secure area away from drains that open on to the lagoon or into the sea.

The concentrate is diluted with water at a rate of 10ml of ATRATHOR per litre of water and applied using a standard hand held plant watering bottle (Figure 2c.). The officer diluting the ATTRATHOR concentrate must wear nitrile gloves and should only dilute the ATTRATHOR in the secure area NOT in the field.

Once diluted, the solution contains approximately 0.26g of Fipronil/litre (0.26g /kg). A single squirt of ATTRATHOR is applied at a heights equal or greater than 1.5 metres and is repeated every 2-3 metres on a vertical surfaces such as beams, walls in building interiors. Once dry, the ATTRATHOR leaves a film, which is not visible to the human eye.



Figure 6: A standard hand held plant watering bottle used for the application of diluted ATTRATHOR solution

5.2 Monitoring plan

Monitoring is used to measure the success of treatment and identify any non-target effects. For example, a monitoring plan will determine the effectiveness of the baiting activity and whether any additional activities are required to reduce yellow crazy ant numbers.

The gathering of information through environmental monitoring programmes will help with management plan review or amendment. Furthermore, the implementation of the monitoring programme will provide an early warning for threats to local biodiversity and peoples' health.

5.2.1 Social monitoring

Surveys of the local community will be undertaken in order to detect possible effects of Fipronil baits on human health. The results of this survey will be used to determine if symptoms reported to occur in spray treatment with Fipronil are also detected when the granular bait is used. The survey was designed according to the Victoria University's Human Ethics Guidelines and approved by the Human Ethics Committee (#21700).

The ecological and social outcomes of monitoring will be assessed and reviewed immediately after monitoring has taken place, and reported back to the stakeholders (EDNRE, Taupulega and villagers).

The yellow crazy ant treatment programme will be adapted and, if necessary, revised according to the outcomes of this social monitoring. If monitoring uncovers unforeseen negative impacts, further treatment may be discontinued, but monitoring will continue.

5.2.1.1 Health surveys

After the completion of treatment a health survey will be given to all participants and villagers. This survey is confidential and has been designed to detect any of the possible health effects associated with high levels of exposure to Fipronil based insecticides. No adverse health effects have been reported in association with Antoff granular baits previously.

5.2.1.2 Social survey

At the end of Year 3 surveys will also be undertaken to gain the villagers perceptions of changes in the effects of yellow crazy ants on their lifestyle, and effects on the environment. This will be compared with a previous survey (2012) and will be also designed according to the Victoria University's Human Ethics Guidelines.

5.2.2 Environmental Monitoring protocols

Control success will be assessed using visual surveys and card counts:

1. Visual survey. A visual inspection of the islet
2. Card counts. Card counts allow a quick assessment of ant density.

5.2.2.1 Visual survey

This method requires a lot of walking and looking. It is best to conduct the visual survey between 6am-10am and 3pm – 6pm, when high temperatures won't prevent ants from being active. . If it is cloudy or cooler, these times can be extended. Survey the entire area where ants are known to occur by walking around and noting occurrences of ants.

- Use a series of overlapping sweeps similar to the way bait was spread in Figure 4 above, (but including the buffer zones where bait stations were used) this will ensure the whole area is covered.
- When searching, disturb the litter layer, soil or infrastructure as it increases ant activity
- Ants are usually highly abundant within the centre of the infestation, and abundance declines towards the edges
- Ants may be present but difficult to detect because abundance declines around the 'invasion front' (the edges of where ants are found).
- Pay particular attention to nonu and other flowering plants in the area as yellow crazy ants are likely to be
- It is important to record the edge of the invaded area. Use any distinct signage (colourful tape or plastic bag) to help define the boundaries of the infestation.
- To enhance detection, stop and observe for a minute or so until an ant is seen. Continue another 5 metres and keep looking around. Continue doing this until ants are no longer found and mark this zone (likely edge of the invasion)

5.2.2.1.1 Monitoring non-target effects

A before-after approach will be used for monitoring non-target effects on resident species. Visual surveys will be repeated twice per year across the entire islet. In the first two years, the survey will be performed before and after treatment. The visual survey will continue for a further 3 years after the final treatment.

Standard assessments (along ten 100 metre X 2 metre transects throughout the treated area) before and after treatment will be made of living and dead hermit crabs and birds (sea birds and shore birds). Also, the lagoon shore around the treatment area will be scanned for washed up marine life, including fish. See Appendix 2 for the sheet.

The ecological outcomes of monitoring will be assessed and reviewed immediately after monitoring has taken place, and reported back to the stakeholders (EDNRE, Taupulega and villagers). If monitoring uncovers unforeseen negative impacts, further treatment may be discontinued, but monitoring will continue.

5.2.2.2 Card counts

'Card counts' are a reliable protocol for monitoring yellow crazy ant infestations. The observer will count the total number of ants crossing sections of a laminated card over a period of 30 seconds.

Yellow crazy ant activity will be measured at 10 stations spaced at 5m intervals along three 50 m transects spaced 10 m apart (Figure 7a). The card count procedure works well if there are three people: each person can do one transect (walking side-by-side 10 m apart) and the time taken is a lot quicker than one person alone. Each person on the team will cover one transect.

Cards (Figure 7b) are subdivided in four sections of equal area (size of each sub-section) and will be placed on the ground, on a flat surface. Prior to initiate counting, one of the sections of each one of the cards placed on one of the three transects will be randomly selected. Only ants crossing the selected section of the card will be quantified for each of the three stations. The mean value for all counting performed on the 3 transects is the card count total.

The card count procedure requires a card and a watch:

1. Make a square card (laminated is preferable as it is stronger and can be re-used, but a sheet of A4 paper works OK. The card / paper should measure 20 X 20 cm, and lines should be drawn on the card to divide it into 4 quadrants (Figure 5b).
2. Choose a starting station (e.g. Figure 5a transect 1, station A)
3. Clear a space on the ground large enough for the card and place the card on the ground
4. Watch the card for up to 20 seconds (tie this) and note which of the quadrants is first crossed by an ant ('A', 'B', 'C' or 'D'). Stop timing when an ant has crossed one of the quadrants or at 20 seconds, whichever comes first. If no ants cross the card in 20 seconds use any quadrant for the next step.
5. For 30 seconds count the number of ants that cross the chosen quadrant. Record this number.
6. Move 5 metres (about 6 paces) to the next station (i.e. Figure 5a transect 1 station B). Repeat steps 3 – 5.
7. Repeat steps 3- 5 a total of 11 times so that 11 numbers are recorded (i.e. one for each station in this transect).
8. Move 10 metres (about 12 paces) across to start transect 2, point a.
9. Repeat steps 3 – 7 to complete transect 2.
10. Repeat steps 8 and 9 to complete transect 3.
11. The mean value for all 3 transects is the card count total for the monitoring site. Repeat the above steps for the other monitoring sites.

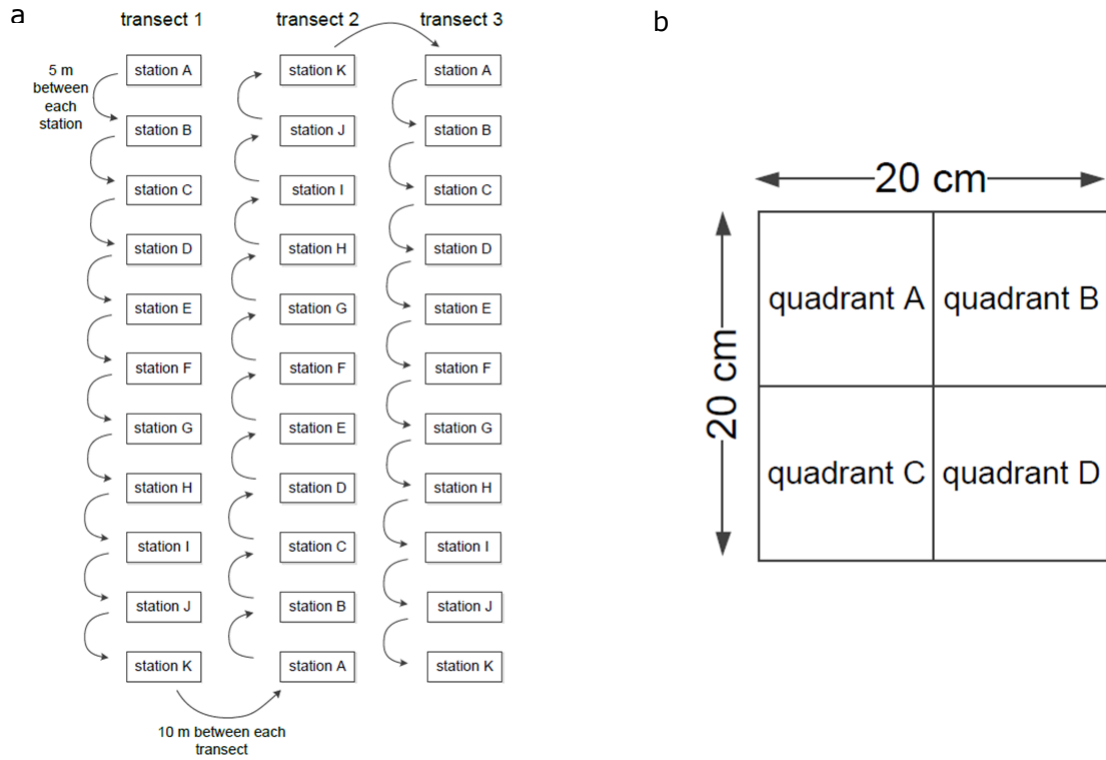


Figure 7: (a) Sampling layout for card counts of yellow crazy ant activity. (b) card used for card counts. The cards do not have to be labelled with 'A', 'B', 'C' and 'D', the labels here are to illustrate the method.

5.3 Evaluation

5.3.1 Evaluate effectiveness of treatment

The target of this management plan is to significantly reduce the number of yellow crazy ants in Atafu by the end of year 2.

Concern was raised during the consultation phase of the project over non target effects of baits on people and crabs. Mortality of non-target species is incorporated in the Monitoring protocols (5.2.2). If high levels of mortality are observed, this management plan may be re-assessed or discontinued.

The targets outlined in the Activity Design for yellow crazy ant management are:

1. By end of Year 3 yellow crazy ants distributed in low abundance over 50% or less of the original infestation in Atafu. Patches where the ant is absent. Reduction in abundance and distribution maintained in Years 4 and 5
2. By end of Year 3 50% or less of people are concerned about the ant
3. By end of Year 3 50% or less want help to make the ants less of a problem

5.3.2 Review management plan

This management plan will be revised and updated over the five-year period as a result of monitoring and evaluation. All decisions made will be communicated to all stakeholders prior to implementation of a revised plan.

6 Acknowledgements

Dr Paul Craddock of FBA Consulting and Dr Ben Hoffmann of CSIRO provided peer review of the initial Management Plan.

The Management Plan refers to:

- Antoff Fipronil Ant Bait MSDS
- Doherty, N. (Pacific Invasives Initiative). 2013. Delimiting Surveys for Invasive Ants. Pacific Invasives Initiative, Auckland, New Zealand.
- Gruber, M. 2014. New Zealand Partnerships for International Development Fund Activity: Building resilience to biosecurity threats from invasive ants throughout the Pacific. Environmental and Social Impact Assessment (ESIA) for Outputs 4 & 5 (management of yellow crazy ant incursions in Tokelau and Kiribati)
- Gruber, M. 2014. New Zealand Partnerships for International Development Fund Activity: Building resilience to biosecurity threats from invasive ants throughout the Pacific. Activity Design (ADD)
- Hoffmann, B. 2009. Dhimurru yellow Crazy Ant Management Plan- A report prepared for Dhimurru Aboriginal Corporation
- Pierce, R., Gruber, M. and Perez, M. 2013. Tokelau Invasive Species Action Plan
- SPC General Emergency Response Plan for Invasive Ant Incursions 2008
- Vanderwoude, C. 2013. Considerations for eradication, containment and long-term monitoring of little fire ants in Tahiti - Report to the Secretariat of the Pacific Regional Environment Programme
- Ward D.F. and Toft, R. 2011. Argentine ants in New Zealand.
<http://argentineants.landcareresearch.co.nz/> (accessed 05/03/2015).



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7 Appendices

7.1 Appendix 1. Warning poster for Antoff Fipronil treatment



KONA

(Fipronili)



Gauega fakatino mo te

Lo Hehega Valea

Mai ai 20/06/2015 ki a 09/07/2015



Mailei



Koga mo na mailei

- **NA HE TAGOFIA NA MAOLEI PE KO TE KOGA MO NA MAILEI**
- **KIKILA LELEI IA TAMAITI I TAIMI UMA**
- **NA HE KAIA NA MEA OLA MAI TE KOGA TENEI**

Mo ni ietahi fakamatalaga, fakamolemole fehokotaki ia
Rafael Barbieri pe ko Allan Burne pe ko Sefo Vulu

7.2 Appendix 2. Tally sheet for visual monitoring

This table should be used to record hermit crabs and birds encountered on the ground and dead fish floating on the lagoon during Visual Delimiting Surveys and Monitoring. It is not important to identify animals to the species level. The data collected will be used to assess any non-target effects of the treatment.

Simply use tally marks (III) in the appropriate column for each animal encountered.

Before Treatment					
Crab		Spider		Insect (other than ants)	
Alive	Dead	Alive	Dead	Alive	Dead
Lizard		Bird		Fish	
After Treatment					
Crab		Spider		Insect (other than ants)	
Alive	Dead	Alive	Dead	Alive	Dead
Lizard		Bird		Fish	

7.3 Appendix 3. Awareness poster for yellow crazy ants

HAVE YOU SEEN THIS ANT?

YELLOW CRAZY ANT (YCA)

PROBLEMS THE ANTS CAUSE



Farms other insects that damage crops



Yellow crazy ant (YCA) worker



Can kill small animals like crabs, birds and lizards



Sprays acid. Annoys people in their homes and at work



YCA worker (smaller) and queen (bigger)

WHAT THEY LOOK LIKE

- Mostly you see workers, not queens
- Movement is erratic – “crazy”
- Long legs and antennae
- Yellowish brown body
- Workers are 3-5mm long
- Queens are much bigger

HOW THEY TRAVEL

Hidden in

- Fruit and other food
- Building materials
- Plants and soil
- Rubbish
- Firewood
- Machinery
- Vehicles

WHERE THEY LIVE

Build nests in and under places like

- Cracks in houses and buildings
- Leaves, rocks and wood
- Rubbish piles
- Crab burrows
- Machinery
- Roots of trees
- Old coconuts
- Firewood piles

IF YOU HAVE SEEN THESE ANTS, or for more information contact the Agriculture or Wildlife Officers, Kiritimati or telephone 65264



PACIFIC BIOSECURITY Cooperate. Control. Protect.



Pacific INVASIVES INITIATIVE



NEW ZEALAND
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7.4 Appendix 4. Material Safety Data Sheet (MSDS) for pesticides used

Material Safety Data Sheet: ANTOFF
Date of Issue: 2nd September 2009

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name: ANTOFF FIPRONIL ANT BAIT

Recommended Use: For the control of invasive ants.
Not for domestic use. Use under permit only.

Supplier Details

Company: Animal Control Technologies (Australia) Pty Ltd
Address: 46-50 Freight Drive Somerton Vic 3062, Australia
Telephone number: 03 9308 9688 (Monday to Friday, 8:00a.m. – 5:00p.m.)
Emergency telephone number: Poisons Information Centre 13 11 26 (24 hours)

2. HAZARDS IDENTIFICATION

Hazard classification: Not classified as a hazardous substance. Concentration of active ingredient in finished bait is below the lowest cut off level for classification as a hazardous substance according to the Australian Safety and compensation Council.
Not classified as a dangerous good according to the Australian code for the transport of Dangerous goods.

Risk phrase(s): None

Safety phrase(s): None

Poisons schedule number: Unscheduled. (Technical grade fipronil is S5)

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Name:	CAS Number:	Proportion (w/w):
Fipronil	120068-37-3	0.01g/kg (0.001% or 10ppm)
Other ingredients not determined to be hazardous		up to 100%

4. FIRST AID MEASURES

First aid: If poisoning occurs, contact a doctor or Poisons Information Centre. Have this MSDS or the label with you. Consult a doctor as needed.

Swallowed: If swallowed do not induce vomiting. Give a glass of water. Immediately contact poisons information centre.

Eye: Flush eyes with copious amounts for water for 15min and consult a doctor as needed.

Skin: Avoid skin contact. May cause skin irritation. Remove contaminated clothing and wash affected area with soap and water. Contact a doctor as needed.

Inhaled: May irritate the throat and nose and cause coughing. Remove from exposure to fresh air.

Advice to doctor: The amount of fipronil in this product is 0.001% and is well below 0.2%, which is the cut off to classification for a hazardous substance. Fipronil is a reversible gamma-aminobutyric (GABA) receptor inhibitor. During intoxication it will induce neurological stimulation with possible convulsions. Fipronil is slow to absorb through the gut and symptoms may be delayed by several hours to a day. Treat symptomatically.

5. FIRE FIGHTING MEASURES

Fire & explosion hazards: Bait is not readily combustible.
Suitable extinguishing media: Carbon dioxide, water, dry agent, foam.
Hazards from combustion: None known
Special protective equipment: Fire fighters should wear full protective gear including self contained breathing apparatus. (AS/NZS 1715, 1716).

6. ACCIDENTAL RELEASE MEASURES

Spills and Disposal: Wear protective clothing including gloves to avoid contact with skin when cleaning up spills. Sweep up any spilled baits and dispose of in a marked and sealed container. Field persistence of fipronil is low to moderate with a half life water of 10-130h and soil of 45-530h. Do not dispose of spiled bait into subsoil/soil or into surface water/ground water.

7. HANDLING AND STORAGE

Precautions for safe handling: To avoid risks for man and environment the instructions for use on the product label are to be followed. Avoid all contact with the product and wear protective clothing and gloves.

Conditions for safe storage: Store in the closed, original container in a dry, cool, well ventilated area out of direct sunlight. Store in a locked room or place, away from children, animals, food, feedstuffs, seed and fertilisers and ignition sources. Fipronil is stable in normal temperatures for one year.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

National exposure standards: No occupation exposure standards have been established for the product.
Biological limit values: No biological limit allocated.
Engineering controls: The formulation of this product decreases the concentration of the active ingredient.
Personal protective equipment: Avoid contact with skin. Wear rubber gloves when handling bait.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Brown small granule with a fish like odour
pH: Not available
Vapour pressure: Not applicable
Vapour density: Not applicable
Boiling point / range: Not applicable
Freezing / melting point: Not available
Solubility in water: 1.9mg/L at 20°C (Technical fipronil)

10. STABILITY AND REACTIVITY

Chemical stability:	Stable for extended time (>1 year) under normal storage and handling conditions less than 30°C.
Incompatible materials:	Fipronil is not stable in the presence of metal ions.
Hazardous decomposition products:	Fipronil is degraded by sunlight to produce a variety of metabolites one of which is fipronil-desulfinyl (MB 46513), which is more toxic than the parent compound.
Hazardous reactions:	No dangerous reactions known under normal conditions and use.

11. TOXICOLOGICAL INFORMATION

<i>Acute:</i>	Fipronil is a moderately hazardous pesticide and is classed by the WHO Class II pesticide. The low concentration in this product and the low application rate make this product non-hazardous by Australian worksafe standards. Fipronil has an oral LD ₅₀ value in rats of 97mg/kg and a dermal LD ₅₀ value of >2000mg/kg. Human toxicity data is not available. To absorb an LD ₅₀ dose for a 200g rat the rat would need to eat approximately 194g of bait.
<i>Chronic:</i>	Fipronil is not mutagenic or teratogenic. In a chronic toxicity study fipronil caused an increase in the incidence of thyroid cancers in rats given the highest dose. The rat thyroid is more sensitive to chemical than the human thyroid and it is not considered to pose a risk of increased incidence of thyroid cancer in humans.

12. ECOLOGICAL INFORMATION

Do not contaminate streams, rivers or waterways with the chemical or used containers. Fipronil is highly toxic to fish and aquatic organisms and dangerous to bees. Fipronil is non-toxic to earth worms.

Persistence and degradability:	Field persistence of fipronil is low to moderate in soil and water. Fipronil has low mobility in soil when in water quickly settles into the sediment.
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13. DISPOSAL CONSIDERATIONS

Triple rinse and bury rinsate and empty containers in a local authority landfill. If no landfill is available, bury the containers below 0.5m in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers should not be burnt. Do NOT re-use containers for any other purpose.

14. TRANSPORT INFORMATION

This product is not classified as a dangerous good according to the Australian Dangerous Goods Code 7th Edn. (2007).

UN number:	Not applicable	UN proper shipping name:	Not applicable
Dangerous Goods Class:	Not applicable	Subsidiary Risk:	Not applicable
Packing group:	Not applicable	Hazchem code:	Not applicable

15. REGULATORY INFORMATION

Poisons schedule number: Finished bait is unscheduled. (Technical grade fipronil is S5)

16. OTHER INFORMATION

Date of Preparation of this MSDS: 2nd September 2009

This Material Safety Data Sheet (MSDS) has been developed using the following references:
National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edn. [NOHSC:2011(2003)]
Australian Dangerous Goods Code 7th Edn. (2007)
Fipronil – Pesticides database, www.pan-uk.org/pestnews/Actives/fipronil.htm

The physical values and properties described in this MSDS are typical values based on scientific literature and material produced to date, and are believed to be reliable. Animal Control Technologies provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. The information is supplied upon the condition that the persons receiving information will make their own determination as to the suitability for their purposes prior to use of this product. Due care should be taken to ensure that the use of this product and its disposal is in compliance with all relevant Federal, State and Local Government regulations.

End of MSDS



Double click on icon to view an electronic version of the MSDS → MSDS

Section 1 - Identification of The Material and Supplier

Ensystem Australasia Pty Ltd
Unit 3, The Junction Estate
AUBURN, NSW 2144
13 35 36 (all hours)

Ensystem New Zealand Ltd
17C Corinthian Drive
Albany, Auckland 0752
0800 ENSYSTE (0800 367 978)

Chemical nature: Fipronil is a phenylpyrazole derivative.

Trade Name: **ATTRATHOR™ Targeted Insecticide**

Product Code: Australia APVMA: 68053 New Zealand HSR Approval: HSR100803

Product Use: Agricultural insecticide for use as described on the product label.

Creation Date: November, 2013

This version issued: September, 2014 and is valid for 5 years from this date.

Section 2 - Hazards Identification**Statement of Hazardous Nature**

This product is classified as: Xn, Harmful. N, Dangerous to the environment. Hazardous according to the criteria of SWA.

Not subject to the ADG Code when transported in Australia by Road or Rail in packages 500 kg(L) or less; or IBCs (refer to SP AU01). However if transported by Air or Sea, this provision does not apply. Then the product is classed as Dangerous (Class 9 Environmentally Hazardous) by IATA and IMDG respectively. See details below and in Section 14 of this SDS.

Risk Phrases: R48/22, R50/53. Harmful: danger of serious damage to health by prolonged exposure if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment.

Safety Phrases: S20, S36, S61, S24/25. When using, do not eat or drink. Wear suitable protective clothing. Avoid release to the environment. Refer to special instructions/Safety Data Sheets. Avoid contact with skin and eyes.

SUSMP Classification: S5

ADG Classification: Class 9: Miscellaneous Dangerous Goods.

UN Number: 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

**GHS Signal word: WARNING****HAZARD STATEMENT:**

H373: May cause damage to organs through prolonged or repeated exposure.

H410: Very toxic to aquatic life with long lasting effects.

PREVENTION

P102: Keep out of reach of children.

P260: Do not breathe fumes, mists, vapours or spray.

P281: Use personal protective equipment as required.

RESPONSE

P314: Get medical advice or attention if you feel unwell.

P352: Wash with plenty of soap and water.

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P332+P313: If skin irritation occurs: Get medical advice.

P337+P313: If eye irritation persists: Get medical advice.

P391: Collect spillage.

P370+P378: Not combustible. Use extinguishing media suited to burning materials. Alcohol resistant foam is the preferred firefighting medium but, if it is not available, normal foam can be used.

STORAGE

P402+P404: Store in a dry place. Store in a closed container.

P410+P403: Protect from sunlight. Store in a well-ventilated place.

DISPOSAL

P501: Dispose of contents and containers as specified on the registered label.

SAFETY DATA SHEET

Issued by: Ensystem Australasia Pty Ltd

Phone: 13 35 36 (ALL HOURS)

Poisons Information Centre: 13 11 26 from anywhere in Australia, (0800 764 766 in New Zealand)

Emergency Overview

Physical Description & Colour: Milky white liquid.

Odour: Mild, characteristic odour.

Major Health Hazards: In a toxicity study involving rats, the clinical signs of toxicity did not reach their peak until two days after treatment in some animals, and deaths did not occur until four days after treatment. Some signs of toxicity and body-weight loss were still evident when the observation period ended at day 7 after treatment.

In rabbits, skin contact Fipronil induced deaths and one or more clinical signs of toxicity including convulsions, sluggishness, salivation, spasms, tremors, hyperactivity, diarrhoea, emaciation, and perioral and perinasal red discolouration in all groups except that at the lowest dose (100 mg/kg).

Clinical signs of oral toxicity included tremors and convulsions of various types, effects on activity or gait, hunched posture, wetness in various body areas, and seizures.

Potential Health Effects

Inhalation:

Short Term Exposure: Available data indicates that this product is not harmful. However product may be mildly irritating, although unlikely to cause anything more than mild transient discomfort.

Long Term Exposure: No data for health effects associated with long term inhalation.

Skin Contact:

Short Term Exposure: Available data indicates that this product is not harmful. It should present no hazards in normal use. However product may be irritating, but is unlikely to cause anything more than mild transient discomfort.

Long Term Exposure: No data for health effects associated with long term skin exposure.

Eye Contact:

Short Term Exposure: This product may be irritating to eyes, but is unlikely to cause anything more than mild transient discomfort.

Long Term Exposure: No data for health effects associated with long term eye exposure.

Ingestion:

Short Term Exposure: Significant oral exposure is considered to be unlikely. However, this product may be irritating to mucous membranes but is unlikely to cause anything more than transient discomfort.

Long Term Exposure: No data for health effects associated with long term ingestion.

Carcinogen Status:

SWA: No significant ingredient is classified as carcinogenic by SWA.

NTP: No significant ingredient is classified as carcinogenic by NTP.

IARC: No significant ingredient is classified as carcinogenic by IARC.

Section 3 - Composition/Information on Ingredients

Ingredients	CAS No	Conc,%	TWA (mg/m ³)	STEL (mg/m ³)
Fipronil	120068-37-3	2.6	not set	not set
Other non hazardous ingredients	various	<10	not set	not set
Water	7732-18-5	to 100	not set	not set

This is a commercial product whose exact ratio of components may vary slightly. Minor quantities of other non hazardous ingredients are also possible.

The SWA TWA exposure value is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. The STEL (Short Term Exposure Limit) is an exposure value that may be equalled (but should not be exceeded) for no longer than 15 minutes and should not be repeated more than 4 times per day. There should be at least 60 minutes between successive exposures at the STEL. The term "peak" is used when the TWA limit, because of the rapid action of the substance, should never be exceeded, even briefly.

Section 4 - First Aid Measures

General Information:

You should call The Poisons Information Centre if you feel that you may have been poisoned, burned or irritated by this product. The number is 13 11 26 from anywhere in Australia (0800 764 766 in New Zealand) and is available at all times. Have this SDS with you when you call.

Inhalation: No first aid measures normally required. However, if inhalation has occurred, and irritation has developed, remove to fresh air and observe until recovered. If irritation becomes painful or persists more than about 30 minutes, seek medical advice.

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Phone: 13 35 36 (ALL HOURS)

Poisons Information Centre: 13 11 26 from anywhere in Australia, (0800 764 766 in New Zealand)

Skin Contact: Wash gently and thoroughly with water (use non-abrasive soap if necessary) for 5 minutes or until chemical is removed.

Eye Contact: No effects expected. If irritation does occur, flush contaminated eye(s) with lukewarm, gently flowing water for 5 minutes or until the product is removed. Obtain medical advice if irritation becomes painful or lasts more than a few minutes. Take special care if exposed person is wearing contact lenses.

Ingestion: If product is swallowed or gets in mouth, do NOT induce vomiting; wash mouth with water and give some water to drink. If symptoms develop, or if in doubt contact a Poisons Information Centre or a doctor.

Section 5 - Fire Fighting Measures

Fire and Explosion Hazards: The major hazard in fires is usually inhalation of heated and toxic or oxygen deficient (or both), fire gases. There is little risk of an explosion from this product if commercial quantities are involved in a fire.

Only small quantities of decomposition products are expected from this product at temperatures normally achieved in a fire. This will only occur after heating to dryness.

Fire decomposition products from this product may be toxic if inhaled. Take appropriate protective measures.

Extinguishing Media: Not combustible. Use extinguishing media suited to burning materials. Alcohol resistant foam is the preferred firefighting medium but, if it is not available, normal foam can be used. Try to contain spills, minimise spillage entering drains or water courses.

Fire Fighting: If a significant quantity of this product is involved in a fire, call the fire brigade. There is little danger of a violent reaction or explosion if significant quantities of this product are involved in a fire. Recommended personal protective equipment is full fire kit and breathing apparatus.

Flash point: Does not burn.

Upper Flammability Limit: Does not burn.

Lower Flammability Limit: Does not burn.

Autoignition temperature: Not applicable - does not burn.

Flammability Class: Does not burn.

Section 6 - Accidental Release Measures

Accidental release: In the event of a major spill, prevent spillage from entering drains or water courses. As a minimum, wear overalls, goggles and gloves. Suitable materials for protective clothing include rubber, PVC, Viton. Eye/face protective equipment should comprise as a minimum, protective goggles. If there is a significant chance that vapours or mists are likely to build up in the clean-up area, we recommend that you use a respirator. Usually, no respirator is necessary when using this product. However, if you have any doubts consult the Australian Standard mentioned below (section 8). Otherwise, not normally necessary.

Stop leak if safe to do so, and contain spill. Absorb onto sand, vermiculite or other suitable absorbent material. If spill is too large or if absorbent material is not available, try to create a dike to stop material spreading or going into drains or waterways. Because of the environmentally hazardous nature of this product, special care should be taken to restrict release to waterways or drains. Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage, and dispose of promptly. Recycle containers wherever possible after careful cleaning. Refer to product label for specific instructions. After spills, wash area preventing runoff from entering drains. If a significant quantity of material enters drains, advise emergency services. Full details regarding disposal of used containers, spillage and unused material may be found on the label. If there is any conflict between this SDS and the label, instructions on the label prevail. Ensure legality of disposal by consulting regulations prior to disposal. Thoroughly launder protective clothing before storage or re-use. Advise laundry of nature of contamination when sending contaminated clothing to laundry.

Section 7 - Handling and Storage

Handling: Keep exposure to this product to a minimum, and minimise the quantities kept in work areas. Check Section 8 of this SDS for details of personal protective measures, and make sure that those measures are followed. The measures detailed below under "Storage" should be followed during handling in order to minimise risks to persons using the product in the workplace. Also, avoid contact or contamination of product with incompatible materials listed in Section 10.

Storage: This product is a Scheduled Poison. Observe all relevant regulations regarding sale, transport and storage of this schedule of poison. Check packaging - there may be further storage instructions on the label.

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Poisons Information Centre: 13 11 26 from anywhere in Australia, (0800 764 766 in New Zealand)

Section 8 - Exposure Controls and Personal Protection

The following Australian Standards will provide general advice regarding safety clothing and equipment:

Respiratory equipment: AS/NZS 1715, Protective Gloves: AS 2161, Occupational Protective Clothing: AS/NZS 4501 set 2008, Industrial Eye Protection: AS1336 and AS/NZS 1337, Occupational Protective Footwear: AS/NZS2210.

SWA Exposure Limits **TWA (mg/m³)** **STEL (mg/m³)**

Exposure limits have not been established by SWA for any of the significant ingredients in this product.

The ADI for Fipronil is set at 0.0002mg/kg/day. The corresponding NOEL is set at 0.02mg/kg/day. ADI means Acceptable Daily Intake; NOEL means No-observable-effect-level. Data from Australian ADI List, Dec 2012.

No special equipment is usually needed when occasionally handling small quantities. The following instructions are for bulk handling or where regular exposure in an occupational setting occurs without proper containment systems.

Ventilation: This product should only be used in a well ventilated area. If natural ventilation is inadequate, use of a fan is suggested.

Eye Protection: Eye protection such as protective glasses or goggles is recommended when this product is being used.

Skin Protection: You should avoid contact even with mild skin irritants. Therefore you should wear suitable impervious elbow-length gloves and facial protection when handling this product. See below for suitable material types.

Protective Material Types: We suggest that protective clothing be made from the following materials: rubber, PVC, Viton.

Respirator: Usually, no respirator is necessary when using this product. However, if you have any doubts consult the Australian Standard mentioned above. Otherwise, not normally necessary.

Section 9 - Physical and Chemical Properties:

Physical Description & colour:	Milky white liquid.
Odour:	Mild, characteristic odour.
Boiling Point:	Approximately 100°C at 100kPa.
Freezing/Melting Point:	Approximately 0°C.
Volatiles:	Water component.
Vapour Pressure:	2.37 kPa at 20°C (water vapour pressure).
Vapour Density:	As for water.
Specific Gravity:	1.0 approx.
Water Solubility:	Completely soluble in water.
pH:	5-7 (as supplied)
Volatility:	No data.
Odour Threshold:	No data.
Evaporation Rate:	As for water.
Coeff Oil/water Distribution:	No data
Autoignition temp:	Not applicable - does not burn.

Section 10 - Stability and Reactivity

Reactivity: This product is unlikely to react or decompose under normal storage conditions. However, if you have any doubts, contact the supplier for advice on shelf life properties.

Conditions to Avoid: Protect this product from light. Store in the closed original container in a dry, cool, well-ventilated area out of direct sunlight.

Incompatibilities: strong acids, strong bases, strong oxidising agents.

Fire Decomposition: Only small quantities of decomposition products are expected from this product at temperatures normally achieved in a fire. This will only occur after heating to dryness. Combustion forms carbon dioxide, and if incomplete, carbon monoxide and possibly smoke. Water is also formed. May form nitrogen and its compounds, and under some circumstances, oxides of nitrogen. Occasionally hydrogen cyanide gas in reducing atmospheres. May form oxides of sulphur (sulphur dioxide is a respiratory hazard) and other sulphur compounds. Most will have a foul odour. May form hydrogen chloride gas, other compounds of chlorine. May form hydrogen fluoride gas and other compounds of fluorine. Carbon monoxide poisoning produces headache, weakness, nausea, dizziness, confusion, dimness of vision, disturbance of judgment, and unconsciousness followed by coma and death.

Polymerisation: This product will not undergo polymerisation reactions.

SAFETY DATA SHEET

Issued by: Ensystem Australasia Pty Ltd

Phone: 13 35 36 (ALL HOURS)

Poisons Information Centre: 13 11 26 from anywhere in Australia, (0800 764 766 in New Zealand)

Section 11 - Toxicological Information

Toxicity: When Fipronil was administered as a single dose to mice or rats orally or by inhalation, deaths and signs of toxicity occurred at all or most doses in animals of each sex. Most or all of the deaths occurred within several days of treatment.

There is no data to hand indicating any particular target organs.

Classification of Hazardous Ingredients

Ingredient	Risk Phrases
Fipronil	>=1%Conc<3%: Xn; R48/22
For Fipronil:	
LD ₅₀ (Oral), Rat 92 mg/kg	LD ₅₀ (Oral), Mouse 91 mg/kg
LD ₅₀ (Dermal), Rat >2000 mg/kg	LD ₅₀ (Dermal), Rabbit 445 mg/kg
LC ₅₀ (Inhal, 4hr), Mouse 0.36-0.42 mg/kg	
For Product:	
LD ₅₀ (Oral), Rat >2,000 mg/kg	LD ₅₀ (Dermal), Rat >2,000 mg/kg
Dermal Irritation (Rabbit): No irritation after 4 hours exposure	
Eye Irritation/ Corrosion, Rabbit: Not irritating for eye of rabbit	

Section 12 - Ecological Information

Very toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment.

For Fipronil:

Fish: LC₅₀ bluegill sunfish (*Lepomis macrochirus*): 0.085mg/L

LC₅₀ rainbow trout: 0.248mg/L

LC₅₀ carp: 0.430mg/L

LC₅₀ Daphnia: 0.19mg/L

In laboratory studies, Fipronil has a half-life of 122-128 days in oxygenated sandy loam. In field studies, dissipation half-life on soil surfaces ranged from 0.7 to 1.7 months. Half-life of

Fipronil applied by soil incorporation ranged from 3 to 7.3 months. Residues remain mainly in the upper 30cm of soil.

Fipronil has low soil mobility - it binds to the soil and has little potential for groundwater contamination.

Fipronil degrades slowly in water and sediment that lack oxygen, with a half-life ranging from 116 to 130 days.

Fipronil is stable to breakdown by water at mildly acidic to neutral pH values.

When exposed to light, Fipronil has a half-life of 3.6 hours in water, and 34 days in loamy soil.

Toxic to bees. Toxic to aquatic organisms.

Section 13 - Disposal Considerations

Disposal: Special help is available for the disposal of Agricultural Chemicals. The product label will give general advice regarding disposal of small quantities, and how to cleanse containers. However, for help with the collection of unwanted rural chemicals, contact ChemClear 1800 008 182 <http://www.chemclear.com.au/> and for help with the disposal of empty drums, contact DrumMuster <http://www.drummuster.com.au/> where you will find contact details for your area.

Section 14 - Transport Information

Not subject to the ADG Code when transported by Road or Rail in Australia, in packages 500kg(L) or less; or IBCs, but classed as Dangerous by IATA and IMDG when carried by Air or Sea transport (see details below).

ADG Code: 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Hazchem Code: *3Z

Special Provisions: 179, 274, AU01

Limited quantities: ADG 7 specifies a Limited Quantity value of 5 L for this class of product.

Dangerous Goods Class: Class 9: Miscellaneous Dangerous Goods.

Packaging Group: III

Packaging Method: P001, IBC03, LP01

Class 9 Miscellaneous Dangerous Goods shall not be loaded in the same vehicle or packed in the same freight container with Dangerous Goods of Class 1 (Explosives).

SAFETY DATA SHEET

Issued by: Ensystem Australasia Pty Ltd

Phone: 13 35 36 (ALL HOURS)

Poisons Information Centre: 13 11 26 from anywhere in Australia, (0800 764 766 in New Zealand)

Section 15 - Regulatory Information

AICS: All of the significant ingredients in this formulation are compliant with NICNAS regulations.
The following ingredient: Fipronil, is mentioned in the SUSMP.

Section 16 - Other Information

This SDS contains only safety-related information. For other data see product literature.
If there is any conflict between this MSDS and the registered label, instructions on the label prevail.

Acronyms:

ADG Code	Australian Code for the Transport of Dangerous Goods by Road and Rail (7 th edition)
AICS	Australian Inventory of Chemical Substances
SWA	Safe Work Australia, formerly ASCC and NOHSC
CAS number	Chemical Abstracts Service Registry Number
Hazchem Code	Emergency action code of numbers and letters that provide information to emergency services especially fire-fighters
IARC	International Agency for Research on Cancer
NOS	Not otherwise specified
NTP	National Toxicology Program (USA)
R-Phrase	Risk Phrase
SUSMP	Standard for the Uniform Scheduling of Medicines & Poisons
UN Number	United Nations Number

THIS SDS SUMMARISES OUR BEST KNOWLEDGE OF THE HEALTH AND SAFETY HAZARD INFORMATION OF THE PRODUCT AND HOW TO SAFELY HANDLE AND USE THE PRODUCT IN THE WORKPLACE. EACH USER MUST REVIEW THIS SDS IN THE CONTEXT OF HOW THE PRODUCT WILL BE HANDLED AND USED IN THE WORKPLACE.
IF CLARIFICATION OR FURTHER INFORMATION IS NEEDED TO ENSURE THAT AN APPROPRIATE RISK ASSESSMENT CAN BE MADE, THE USER SHOULD CONTACT THIS COMPANY SO WE CAN ATTEMPT TO OBTAIN ADDITIONAL INFORMATION FROM OUR SUPPLIERS
OUR RESPONSIBILITY FOR PRODUCTS SOLD IS SUBJECT TO OUR STANDARD TERMS AND CONDITIONS, A COPY OF WHICH IS SENT TO OUR CUSTOMERS AND IS ALSO AVAILABLE ON REQUEST.

Please read all labels carefully before using product.

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SAFETY DATA SHEET

Issued by: Ensystem Australasia Pty Ltd

Phone: 13 35 36 (ALL HOURS)

Poisons Information Centre: 13 11 26 from anywhere in Australia, (0800 764 766 in New Zealand)



Bait Technology Ltd
PO Box 100287
North Shore
Auckland 0745
Phone 09 443 9219
Fax: 09 443 5083

MATERIAL SAFETY DATA SHEET

Date of Preparation: July 2015

VANQUISH PRO™ ANT BAIT

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Vanquish Pro™ Ant Bait

RECOMMENDED USE

Control and eradication of Argentine ants and other ant species.

COMPANY IDENTIFICATION

Bait Technology Ltd,
42B Ellice Rd, Glenfield, Auckland,
Phone: 09 443 9219
Fax: 09 443 5083

EMERGENCY TELEPHONE NUMBERS 24 HRS

0800 CHEMCALL™ 0800 243 622
National Poisons Centre 0800 764 766

2. HAZARDS IDENTIFICATION



HSNO Classification

9.1A Very toxic to the aquatic environment with long lasting effects,
9.4C Toxic to terrestrial invertebrates

AppearancePale green moist paste
Health HazardsNo human health hazards when used as directed on the label
Skin IrritantNon-irritant
Eye IrritantPhysical irritant only
SensitisationNot sensitizing
FlammabilityNot flammable
CorrosivenessNot corrosive

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients	Wt%
Fipronil	0.01
Non Hazardous Ingredients	99.99

CAS NO. 120068-37-3

4. FIRST AID MEASURES**SWALLOWED**

Not likely to cause any adverse symptoms unless in excessive amounts.
Seek medical advice if patient is distressed.

EYES

Hold eye open and rinse slowly and gently with water for 15-20 minutes.
If contact lenses are present, remove after first 5 minutes, then continue rinsing eye.
Call for medical advice if irritation persists.

SKIN

For extensive contamination, remove contaminated clothing.
Rinse skin immediately with plenty of water for 10 minutes.
Call for medical advice if adverse symptoms are evident or patient is distressed.

5. FIRE FIGHTING MEASURES**Flash Point**

100 °C

Fire and explosion hazards

Not flammable or explosive

Fire Fighting Instructions

Hazchem 3Z

Combustible in fire conditions.

Will give off moderately toxic vapours.

Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

Evacuate unprotected personnel

Persons who have been exposed to smoke should be checked by a physician for symptoms of poisoning.

6. ACCIDENTAL RELEASE MEASURES

SPILLS AND DISPOSAL

If Vanquish Pro™ Ant Bait is spilled on the ground in an area not intended for ant control or in amounts in excess of the label instructions; the spilled area should be scraped clean and placed in a disposal container for disposal at an approved hazardous waste disposal site.

DO NOT allow the spill or scraped residue to enter a public sewer, waterway, creek, stream or lake!

7. HANDLING AND STORAGE

Handling Avoid prolonged contact with skin and eyes. Avoid breathing dust.

Storage Do not contaminate water, food, or feed by storage or disposal.

DO NOT TRANSFER THIS PRODUCT TO ANOTHER CONTAINER FOR USE OR STORAGE

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

The following controls are indicated where a potential for excessive exposure is indicated such as manufacture, packaging or widespread application.

Eye / Face Protection

A minimum of safety glasses with side shields should be worn when working in industrial environments.

Body Protection

Skin contact should be minimised by wearing gloves and long-sleeved clothing. Contaminated clothing must be washed before re-use, or disposed of.

Respiratory Protection

Not normally required unless hazardous quantities of dust are present. An OSH - approved dust mask should be adequate.

Exposure Limits

None established

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	pale green
Physical State	creamy paste
Odour	essentially odourless
pH	7
Solubility	disintegrates to an insoluble suspension in water
Decomposition temperature	> 100°C

10. STABILITY AND REACTIVITY

Chemical Stability	Stable in intact packaging for at least 2 years. Will not polymerise or react violently when opened.
Bacterial Stability	Contains natural products subject to bacterial decomposition over several days when exposed to air
Conditions to Avoid	Direct sunlight and temperatures above 40°C
Incompatibility	Strong oxidising agents such as free chlorine, nitrites, nitrates, peroxides

11. TOXICOLOGICAL INFORMATION

Acute Oral Toxicity	LD ₅₀ Rat (oral) >2000 mg/kg (Technical grade Fipronil 97 mg/kg)
Acute Dermal Toxicity	LD ₅₀ Rabbit >3540 mg/kg
Skin Irritation	Non-irritant
Eye Irritant	Physical irritant only
Sensitisation	Not sensitizing

Vanquish Pro™ Ant Bait has a very low mammalian toxicity and extremely high consumption would be required to achieve toxicity.

Other information:

In a chronic toxicity study, rats receiving the highest dose of Fipronil showed an increased incidence of thyroid tumours. The rat thyroid gland is very sensitive to chemicals and functions differently from the human thyroid, and therefore, Fipronil is not considered to pose an increased risk of cancer to humans. Similar studies in mice and dogs did not show an increased incidence of thyroid tumours. Fipronil is not mutagenic and not teratogenic.

12. ECOLOGICAL INFORMATION

Environmental Precautions

Fipronil is extremely toxic to fish and aquatic Invertebrates. This effect will be apparent in the quantities present in Vanquish Pro™ Ant Bait.

DO NOT allow Vanquish Pro™ Ant Bait to wash into sewers, streams, waterways, lakes, rivers or the sea.

Ecological Toxicity	Rainbow Trout LC ₅₀ 2460 mg/L (96 hr)
	Daphnia LC ₅₀ 1900 mg/L (48 hr)
	Oysters LC ₅₀ 7700 mg/L (96 hr)
	Honeybee LC ₅₀ 40 µg/bee

Environmental Fate

Soil The Fipronil active of Vanquish Pro™ Ant Bait binds to soil and has little potential for groundwater contamination.

Water The Fipronil active of Vanquish Pro™ Ant Bait is stable to breakdown by water. It degrades with a half-life of 28 days.

Environmental Exposure Limits

EEL_{marine water} 0.22 ng / L (ERMA NZ)
EEL_{fresh water} 78 ng / L

The bait is not to be used in a horticultural or agricultural environment where it could cause residues to occur in edible or export crops.

13. DISPOSAL CONSIDERATIONS

Empty tubes must be rendered non-hazardous to the environment by incineration, depositing at an approved landfill or mixing with an inert substance that reduces the residual bait concentration to a negligible level.

Empty tubes must not be disposed of where any remaining content could leach into sewers, waterways, streams, creeks, or the sea.

DO NOT REUSE EMPTY CONTAINERS

14. TRANSPORT INFORMATION

Where Vanquish Pro™ Ant Bait is transported in multiple packaging and the outer packaging obscures the tube label information the outer packaging must:

- be clearly labelled with information showing that Vanquish Pro™ Ant Bait is ecotoxic with respect to aquatic organisms or
- labelled or marked in compliance with either the Land Transport Rule 45001, Civil Aviation Act 1990 or the Marine Safety Act 1994 as relevant, or
- display an EU "Dangerous to the Environment" pictogram or bear the relevant class or subclass label assigned by the UN Model Regulations
- UN Number 3082
- DG Class 9

**15. REGULATORY INFORMATION**

EPA Manufacturing Approval no. HSR000111

16. OTHER INFORMATION

Date: July 2015

NOTICE

Information for this product is believed to be reliable, however buyer and user assume all risk of use, handling and storage whether in accordance with directions or not.

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Bait Technology Ltd
PO Box 100 287
NSMC
Auckland 0745
Phone 09 443 9219
Fax: 09 443 5083

MATERIAL SAFETY DATA SHEET

Date of Preparation: July 2015

XSTINGUISH™ ARGENTINE ANT BAIT

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Xstinguish™ Argentine Ant Bait

RECOMMENDED USE

Control and eradication of Argentine ants and other ant species.

COMPANY IDENTIFICATION

Bait Technology Ltd,
42B Ellice Rd, Glenfield, Auckland,
Phone: 09 443 9219
Fax: 09 443 5083

EMERGENCY TELEPHONE NUMBERS 24 HRS

0800 CHEMCALL™ 0800 243 622
National Poisons Centre 0800 764 766

2. HAZARDS IDENTIFICATION



HSNO Classification

9.1A Very toxic to the aquatic environment with long lasting effects,
9.4C Toxic to terrestrial invertebrates

AppearancePale green moist paste
Health HazardsNo human health hazards when used as directed on the label
Skin IrritantNon-irritant
Eye irritantPhysical irritant only
SensitisationNot sensitizing
FlammabilityNot flammable
CorrosivenessNot corrosive

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients	Wt%
Fipronil	0.01
Non Hazardous Ingredients	99.99

CAS NO. 120068-37-3

4. FIRST AID MEASURES**SWALLOWED**

Not likely to cause any adverse symptoms unless in excessive amounts.

Seek medical advice if patient is distressed.

EYES

Hold eye open and rinse slowly and gently with water for 15-20 minutes.

If contact lenses are present, remove after first 5 minutes, then continue rinsing eye.

Call for medical advice if irritation persists.

SKIN

For extensive contamination, remove contaminated clothing.

Rinse skin immediately with plenty of water for 10 minutes.

Call for medical advice if adverse symptoms are evident or patient is distressed.

5. FIRE FIGHTING MEASURES**Flash Point**

100 °C

Fire and explosion hazards

Not flammable or explosive

Fire Fighting Instructions

Hazchem 3Z

Combustible in fire conditions.

Will give off moderately toxic vapours.

Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

Evacuate unprotected personnel

Persons who have been exposed to smoke should be checked by a physician for symptoms of poisoning.

6. ACCIDENTAL RELEASE MEASURES

SPILLS AND DISPOSAL

If Xstinguish™ Argentine Ant Bait is spilled on the ground in an area not intended for ant control or in amounts in excess of the label instructions; the spilled area should be scraped clean and placed in a disposal container for disposal at an approved hazardous waste disposal site.

DO NOT allow the spill or scraped residue to enter a public sewer, waterway, creek, stream or lake!

7. HANDLING AND STORAGE

Handling Avoid prolonged contact with skin and eyes. Avoid breathing dust.

Storage Do not contaminate water, food, or feed by storage or disposal.

DO NOT TRANSFER THIS PRODUCT TO ANOTHER CONTAINER FOR USE OR STORAGE

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

The following controls are indicated where a potential for excessive exposure is indicated such as manufacture, packaging or widespread application.

Eye / Face Protection

A minimum of safety glasses with side shields should be worn when working in industrial environments.

Body Protection

Skin contact should be minimised by wearing gloves and long-sleeved clothing. Contaminated clothing must be washed before re-use, or disposed of.

Respiratory Protection

Not normally required unless hazardous quantities of dust are present. An OSH - approved dust mask should be adequate.

Exposure Limits

None established

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	pale green
Physical State	creamy paste
Odour	essentially odourless
pH	7
Solubility	disintegrates to an insoluble suspension in water
Decomposition temperature	> 100°C

10. STABILITY AND REACTIVITY

Chemical Stability	Stable in intact packaging for at least 2 years. Will not polymerise or react violently when opened.
Bacterial Stability	Contains natural products subject to bacterial decomposition over several days when exposed to air
Conditions to Avoid	Direct sunlight and temperatures above 40°C
Incompatibility	Strong oxidising agents such as free chlorine, nitrites, nitrates, peroxides

11. TOXICOLOGICAL INFORMATION

Acute Oral Toxicity	LD ₅₀ Rat (oral) >2000 mg/kg (Technical grade Fipronil 97 mg/kg)
Acute Dermal Toxicity	LD ₅₀ Rabbit >3540 mg/kg
Skin Irritation	Non-irritant
Eye Irritant	Physical irritant only
Sensitisation	Not sensitizing

Xstinguish™ Ant Bait has a very low mammalian toxicity and extremely high consumption would be required to achieve toxicity.

Other information:

In a chronic toxicity study, rats receiving the highest dose of Fipronil showed an increased incidence of thyroid tumours. The rat thyroid gland is very sensitive to chemicals and functions differently from the human thyroid, and therefore, Fipronil is not considered to pose an increased risk of cancer to humans. Similar studies in mice and dogs did not show an increased incidence of thyroid tumours. Fipronil is not mutagenic and not teratogenic.

12. ECOLOGICAL INFORMATION

Environmental Precautions

Fipronil is extremely toxic to fish and aquatic Invertebrates. This effect will be apparent in the quantities present in Xstinguish™ Argentine Ant Bait.

DO NOT allow Xstinguish™ Argentine Ant Bait to wash into sewers, streams, waterways, lakes, rivers or the sea.

Ecological Toxicity Rainbow Trout LC₅₀ 2460 mg/L (96 hr)

Daphnia LC₅₀ 1900 mg/L (48 hr)

Oysters LC₅₀ 7700 mg/L (96 hr)

Honeybee LC₅₀ 40 µg / bee

Environmental Fate

Soil The Fipronil active of Xstinguish™ Argentine Ant Bait binds to soil and has little potential for groundwater contamination.

Water The Fipronil active of Xstinguish™ Argentine Ant Bait is stable to breakdown by water. It degrades with a half-life of 28 days.

Environmental Exposure Limits

EEL_{marine water} 0.22 ng / L (ERMA NZ)

EEL_{fresh water} 78 ng / L

The bait is not to be used in a horticultural or agricultural environment where it could cause residues to occur in edible or export crops.

13. DISPOSAL CONSIDERATIONS

Empty tubes must be rendered non-hazardous to the environment by incineration, depositing at an approved landfill or mixing with an inert substance that reduces the residual bait concentration to a negligible level.

Empty tubes must not be disposed of where any remaining content could leach into sewers, waterways, streams, creeks, or the sea.

DO NOT REUSE EMPTY CONTAINERS

14. **TRANSPORT INFORMATION**

Where Xstinguish™ Argentine Ant Bait is transported in multiple packaging and the outer packaging obscures the tube label information the outer packaging must:

- be clearly labelled with information showing that Xstinguish™ Argentine Ant Bait is ecotoxic with respect to aquatic organisms or
- labelled or marked in compliance with either the Land Transport Rule 45001, Civil Aviation Act 1990 or the Marine Safety Act 1994 as relevant, or
- display an EU "Dangerous to the Environment" pictogram or bear the relevant class or subclass label assigned by the UN Model Regulations
- UN Number 3082
- DG Class 9



15. **REGULATORY INFORMATION**

ERMA Manufacturing Approval no. HSR000111

16. **OTHER INFORMATION**

Updated June 2015

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7.5 Appendix 5. Additional monitoring protocols

The protocols below are useful where information about ant species identity or ant or other invertebrate community structure is required. They have been modified from the Landcare Argentine Ant webpage (<http://argentineants.landcareresearch.co.nz/>)

7.5.1 Pitfall trap instructions

Pitfall traps can be a useful technique for collecting yellow crazy ants, other ant species or for getting an idea of the general invertebrate community structure in an area before and after treatment. In fact, in some circumstances pitfall traps may be better than direct searching, or using baits.

Pitfall trapping involves digging a small plastic cup or pottle into the ground, so the open lip is level with the ground (Figure 6). As ants (and other invertebrates) run along the ground they fall into the cup and cannot get out.

When setting the traps, it is a good idea to put two cups in the hole you have dug as soil and other debris will fall into the cup as you set it. When you are happy that the lip of the cup is level with the surrounding earth you can remove the top cup and add the preservative. A preservative of ethanol:glycol mix (50:50, or 75:25 or propylene glycol alone) is often used to kill invertebrates, preserve them from rotting, and prevent them from crawling out of the cup. For traps that will be in the ground for shorter periods (e.g. 1 day) soapy water will suffice, however it is important to sort the traps and put the specimens in >70% ethanol as soon as they are recovered or the insects you have caught will start to rot.

The cups used need to be plastic (to avoid them breaking) and about 8cm in diameter. Pitfall traps are usually spaced about 5–10 m apart and should be left out for approximately 24 hours. Pitfall traps give information on presence and absence of yellow crazy and other ant species as well the state of other invertebrate communities.

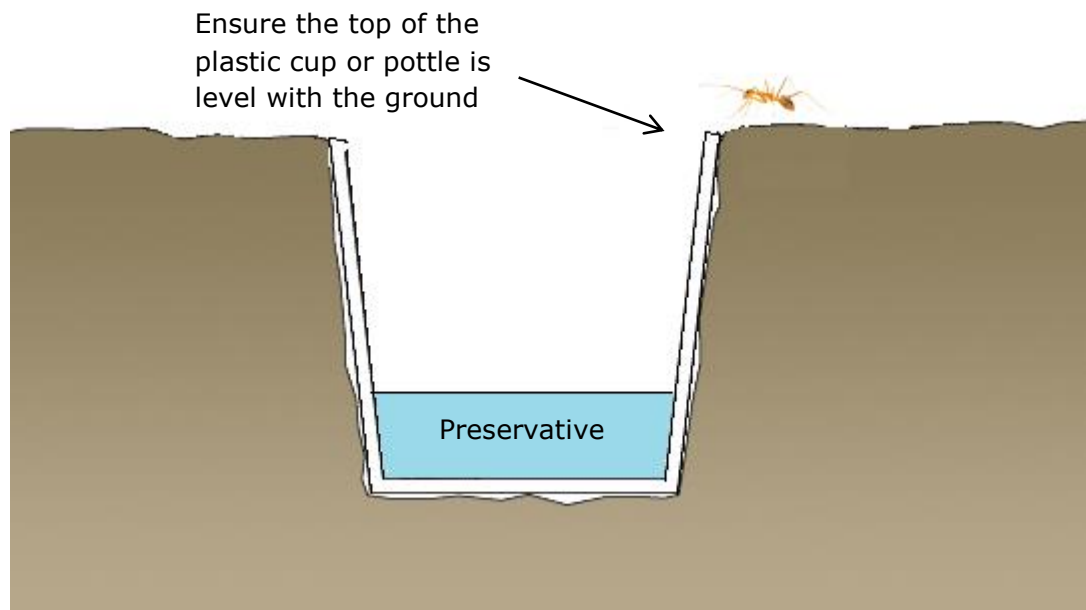


Figure 6: A cross section through an embedded pitfall trap.

7.5.2 Baited Vials (Pottles)

This is a commonly used technique, and has gained wide acceptance for surveillance and monitoring.

Typically, a non-toxic bait such as tuna, peanut butter, honey or a cotton wool ball soaked in sugar water is placed into a small plastic vial or pot. The bait attracts ants, which recruit other ants to come and collect the bait and take it back to their nest.

Baited vials are placed out of the sun with lid off for a minimum of 3 hours. Baits can be left out for quite a long period depending on your specific conditions, even up to 24 hours. However, the longer vials are left out means the bait will more likely dry out and become unpalatable, or vials may be vandalised. Vials are usually spaced about 10 m apart, in groups of 10–20 vials. Vials need to be plastic (to reduce breakage) and numbered so that specific locations can be found again if ants of interest are detected.

Baiting gives information on presence and absence of various ant species. In addition, it can give a very rough indication of abundance, though factors such as time of day, time of year and temperature can cause significant variation, so it is suggested this only be viewed as a very rough guide.

7.5.3 Baited Tiles

This method uses a digital camera to record the numbers of ants on and around a bait placed in the middle of a ceramic tile. The tiles should all be the same size, about 10 × 10 cm being perfect. The tiles should be of a pale colour to contrast with the ants, and have a matt finish rather than gloss, so they do not create glare points that obscure ants when photographing.



Figure 7: Three types of attractant bait (tuna, honey and peanut butter) applied to a baited tile showing recruitment by yellow crazy ants.

A line (or grid) of 20 or 30 tiles placed 5–10 m apart provides a good assessment of ant abundance in an area. A small amount of suitable non-toxic bait (e.g. a half-teaspoon of tinned tuna, peanut butter or honey) can be placed in the centre of the tile and the tiles left. Liquid baits are not effective for this method because they run off the tiles, but cotton wool balls soaked in 30% sugar solution will work fine.

If you are doing multiple sites, you can use a marker pen to write a site/transect identifier letter, and the number of the tile in the transect if using fixed positions, e.g. A1, A2, etc.

Return to the tile after one hour and take a photo. A typical compact digital camera (6 megapixel or higher) with a macro function is used to take an image of every tile. Frame the photograph so it is as close as possible to the bait while having the entire tile within the image frame.

Afterwards, view the images on a computer screen. The label on the tile identifies the site and tile number for each photograph. The camera itself records the date and time of exposure in the exif file data that is automatically saved with the image (just ensure the date and time settings on your camera are correct). After recording this data in a spreadsheet, simply count all the ants that are within the bounds of the tile edges (including those on the bait itself and those just walking over the tile). Using the edges of the tile as a boundary gives the exact same area to count in each photo.

The ceramic tiles have sufficient weight that they remain in place, even in windy conditions, and they are easily washed clean for use in later trials. A cloth dampened with methylated spirits can be used to wipe the marker pen lettering off the corner if you wish to re-label them in the future. One drawback with the tiles is if you are using them in an area frequented by pets or birds that may take the bait before counting. In these situations you should consider remaining on site and slowly walking up the line to discourage any animals. You can also shorten the time they are left before photographing to 30 minutes, which is often sufficient in heavily infested areas. However, if using this method to monitor changes, you need to standardise the length of time the baited tiles are left and use that for all subsequent measures.

7.5.4 Recording baseline and post-treatment data

Pitfall traps can be useful for assembling information about invertebrate communities before and after treatment. However, it is difficult to identify everything that is caught and can often require expert taxonomist, which can be expensive.

One way to sort traps is by 'morpho-species' – grouping animals that look the same and counting how many varieties are present. For example you may find six different types of beetle, two different crabs and four different spiders in one trap. Studies have shown that this sort of grouping performed by unskilled workers can be as high as 95% as accurate as expert taxonomists.

The table below is a useful way to record what is caught at a particular site for comparison of before and after treatment.

Location:		Inspected by:	Date
Organism type	Tally of different Morpho-species	Comments:	
Worms			
Crabs			
Spiders			
Beetles			
Ants			
Moths & Butterflies			
Crickets			
Bugs			
Thrips			

7.6 Appendix 6. Health survey

Information sheet

Background and purpose of the study

We want to find out if the pesticide used to control yellow crazy ants has any health impacts on humans. No effects on humans have been previously reported and none are expected, as this pesticide is widely used. A thorough risk assessment has been done, which has assessed the pesticide as being safe. However no studies have been undertaken to confirm this pesticide has no effects on humans. If any effects are detected the pesticide use will be stopped.

Informed consent

The Victoria University of Wellington Human Ethics Committee, which has approved this project, requires that all research involves participants who are: 1) fully informed about the nature of the research; and 2) consent to participate. This process is to ensure that research participants and their communities are protected from any negative consequence potentially arising from their participation in the research. This Information sheet and survey meet these requirements. The research is strictly anonymous, an information sheet is supplied and informed consent is given by voluntary participation in answering the Health Survey questions.

Survey format

The research involves answering a set of questions about the participant's health in recent weeks. The informal verbal survey will take approximately 10 - 20 minutes and there is no obligation to answer all of the questions. The participant has the right to check their responses if they wish. The surveys will be returned to Victoria University, entered into a database and summarised. A report of the summarised results will be made to the Taupulega and EDNRE within 1 month of the survey's completion. The surveys and summarised data may be retained for publication in a scientific journal, and destroyed subsequent to publication. Copies of any publication will be provided to the Taupulega and EDNRE for the interviewee. If there are any questions, concerns or further information required at any time, please contact EDNRE officers or Pacific Biosecurity:

Monica Gruber / Rafael Barbieri / Allan Burne
Pacific Biosecurity, Victoria Link Limited, Victoria University of Wellington
PO Box 600, Wellington 6140
New Zealand
ph: +64 4 463 5026 / +64 27 658 9903
email: monica.gruber@vuw.ac.nz / rafael.barbieri@vuw.ac.nz /
allan.burne@vuw.ac.nz

ANT MANAGEMENT HEALTH SURVEY

Date:

Have you been unwell **before** April 23 2015

- Yes
- No

If Yes, please give details of your symptoms

Have you experienced any of the following symptoms **before** April 23 2015

- Skin irritation
- Excessive sweating
- Nausea
- Vomiting
- Head ache
- Stomach pain
- Dizziness
- Weakness
- Seizures

Have you been unwell **after** April 23 2015

- Yes
- No

If Yes, please give details of your symptoms

Have you experienced any of the following symptoms **after** April 23 2015

- Skin irritation
- Excessive sweating
- Nausea
- Vomiting
- Head ache
- Stomach pain
- Dizziness
- Weakness
- Seizures

If you ticked any of the boxes above, what date did you first experience the symptoms?

If you ticked any of the boxes above, how long did the symptoms last?

- 1 day
- 3 days
- 1 week
- Longer than 1 week

Have you experienced these symptoms before April 2015?

- Yes
- No

If Yes, please give details (all information will be treated as confidential)

Do you have an existing medical condition?

- Yes
- No

If Yes, please give details (all information will be treated as confidential)

Have you touched Antoff bait while working with it?

- Yes
- No

If Yes:

- How long ago did you last touch the bait?
-

- How long did you work with the bait for (how many hours / days)?
-

Were you wearing any of the following Personal Protection Equipment (PPE):

- Gloves
- Long sleeved shirt
- Long trousers
- Enclosed shoes
- Dust mask

Have you eaten Antoff bait?

- Yes
- No

If Yes:

- How long ago did you eat the bait?
-

- How much bait did you eat?
-

Have you eaten animals (Chicken, Fish, Crab, etc.) or plants collected from within or near the treatment area?

- Yes
- No

If Yes:

- Where were the animal(s) / plants collected?

- Which animal(s) / plants did you eat?

- How long ago did you eat the animal(s) / plants?

- How many did you eat?

Thank You

7.7 Appendix 7. Record of outcomes of treatment and monitoring

7.7.1 June 2015

Date	Activity	Results	Outcomes
22 Jun Monday	7am Arrival in Atafu	All luggage, water supplies, additional gear and food unloaded from Lady Naomi.	Atafu was waiting us and gave us flower crowns at arrival on land. All cargo was taken from the wharf and piled in front of the transport office awaiting ta truck to take it to the houses PB and FBA are staying in.
	Truck transported all personal gear/luggage to each of the three houses hosting PB and FBA.	Accommodation was prearranged and each house holds 3 staff.	PB staff received a friendly reception from their landlords.
	Meeting with Taupulega to introduce Pacific Biosecurity and FBA staff, discuss the Management Plan and treatment activities for the 14 day period on Atafu.	All 9 staff were introduced to the Taupulega. Rafael spoke first and introduced PB. Rafael also provided an overview of the activities and stressed that a positive result means lower numbers of ants on Atafu. Allan also talked about the workshops and the outcomes of this partnership with Atafu/Tokelau. Viv also talked to the Taupulega and introduced her staff and spoke about her expectations. She also stressed that a positive goal is to provide relief and not eradication.	<p>The Taupulega asked about the environmental impacts of Fipronil. Rafael assured them that PB and FBA are taking great care not to contaminate the lagoon and that Fipronil is safe if used according to the label instructions. Rafael said that it is possible that crabs will be affected, but PB and FBA will do their best to minimize impacts on environment and human health. Rafael also described the need for a 43 day Withholding period (WHP) on harvesting food from treated areas and that this WHP is a very careful approach to avoid any potential side effects.</p> <p>The Taupulega also asked about future legislation on Biosecurity and if the outcomes of this project would put in place a legislation to Atafu only, or Tokelau as a whole. Allan explained that PB has no authority to impose legislation on Biosecurity but that the outcomes of the partnership can be</p>

			<p>used to guide this piece of legislation.</p> <p>Taupulega acknowledged that PB and FBA are on Atafu and are happy that this is a long term programme that intends to provide them the knowledge they need to deal with future invasions, including the little fire ant.</p>
	<p>Communication with partner stakeholders (EDNRE+PB+FBA)</p>	<p>PB+FBA+Menny+Aokuso+Leuta+Chris (one rep. from each atoll) participated in a discussion about what we plan to do over the next fourteen days and what is required to achieve our goals.</p>	<p>The discussion highlighted a number of requirements of the project for which approval or authorisation from the Taupulega had not yet been confirmed. This requirements included: 1) 25 workers; 2) a Village meeting to outline to the community how the management activity will be proceeding over the next 14 days; 3) a day to run the workshops for the EDNRE officers and Taupulega reps from the three atolls; 4) talk to the children at school about the management plan and the potential hazards associated with the bait. Leuta noted the requirements and agreed to follow up on them with the Taupulega.</p> <p>Aokuso told us that since arriving on Atafu the reps and EDNRE officers from Fakaofu and Nukunonu had been working with their counterparts from Atafu on waste management and were working to remove the excess rubbish from the vao while we were meeting.</p>
	<p>Check on bait and equipment shipped to Atafu prior to our arrival.</p>	<p>Aokuso told us where the cargo was and took us to the warehouse. When we all (PB+FBA) arrived at the warehouse, we found that all the cargo was removed from the sheltered area on Saturday and left in full sun and exposed to rain over the past 3 days. We were told this was because an auditor from New Zealand needed access to the shed where it was stored.</p>	<p>PB and FBA staff removed the cellophane wrap binding the bait and checked the interior for temperature. It was noted that the bait at the core of the pallet block was warm/hot to the touch. This raised some concerns as to whether the efficacy of the bait had been compromised. After some discussion among PB and FBA staff it was decided that as Fipronil is known to be a stable compound and as there was no reliable way of testing whether the product was ruined within the timeframe available to us it was better to proceed with the programme.</p> <p>Rafael asked the locals to place the bait pallets in the warehouse immediately otherwise the bait could lose effectiveness.</p>

	Update on our request to Taupulega	Leuta brought word from the Taupulega concerning the arrangements made for helpers from the village and a schedule for community meetings.	FBA+PB will meet the village tomorrow morning at 9am. After the village meeting, Allan will give the Health and Safety workshop for the EDNRE officers, Taupulega reps and 25 workers. We will then got to the school to talk to the children It was confirmed that 25 workers would be provided by the village to help with baiting.
	Welcome and feast	The Taupulega put on a feast to welcome the PB and FBA staff. This afforded us an opportunity to talk informally with the Taupulega. The feast was followed by a cultural evening of song and dance performed by Atafu villagers that had recently returned from representing their Atoll in the Nukunonu Catholic Church 150 th celebrations.	Sefo told Allan that the cyclone in February (2015) had washed away most of the YCA from the vao and that they were not really a problem anymore. Sefo also said that they had done some work on the YCA after Monica and Rafael's visit in November 2014. It was unclear what this work was, but may have referred to the mosquito spraying that was done after the Chikungunya virus outbreak in late 2015.
23 Jun Tuesday	FBA started baiting (only the 5 staff)	FBA placed bait stations all around the southern portion of the village. However, only 6.5kg of bait was used –less than the prescribed 10kg/ha. It is therefore important to follow up with a broadcast treatment in inaccessible areas.	Allan and Rafael had a meeting with FBA to discuss any issues they had on the first day baiting. FBA said that some areas around the village cannot be baited using bait stations only. The areas where bait stations will be ineffective are basically bush patches around the houses and parts of the village that contain piles of rubbish and. Rafael and Allan will talk to Sefo/Taupulega tomorrow to request permission to bait these areas using spreaders.
	Village meeting	Allan presented an outline of the management plan to the village. Rafael and Viv also attended the meeting, Leuta and Aokuso	Questions from the villagers: <i>When do we know it is safe for the village to harvest or collect food? Also, could houses close to the sea be contaminated?</i>

		<p>translated. About 60-70 villagers attended. The power went out early on, so the presentation was given without PowerPoint. Warren recorded the full meeting.</p> <p>There were questions from the villagers at the end of the presentation. Rafael took notes of the questions and the answers to the villagers listed here were translated to English by Leuta from Aokuso's translations of Allan's answers.</p>	<p>Allan explained about the WHP and that close to the houses the bait will be in bait stations and paste, not spread on the ground.</p> <p><i>Will the rain affect the baits on the ground?</i></p> <p>Allan answered that the bait would not be spread within five hours of rain or if rain is anticipated.</p> <p><i>Concerns about the children and their safety.</i></p> <p>Allan explained that we will talk to the kids at school and that they would need to consume several kilos of bait to get sick.</p> <p><i>Are other ants affected/brought by the sea?</i></p> <p>The target is to minimize the YCA not other ants.</p> <p><i>Concerns about the pigsty. Is it safe for the pigs?</i></p> <p>Allan and Viv responded that we will use the strong bait stations placed well out of reach in this area to avoid contamination. Thus it is safe to eat the pigs.</p> <p><i>Will the bait affect the soil?</i></p> <p>Allan explained that the bait degrades over time will eventually disappear so it will not affect the soil.</p> <p><i>What do we do if somebody is poisoned by the bait? Do we go to the hospital? Is there a plan?</i></p> <p>Allan explained that an adult would need to consume a very large quantity of bait before they would be affected. The lady replied and said that we did not answer the question. About what to do if somebody is sick? Allan explained what the possible symptoms of exposure are and that only one person has ever been poisoned and that person was spraying Fipronil unprotected for five hours and that the symptoms cleared by themselves. Allan repeated that it is very unlikely that anyone will get sick, but if someone does they should look for medical assistance.</p> <p><i>Was this project done in other countries and how it went?</i></p>
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			<p>Allan said that Antoff was used recently in Kiribati without any adverse effects on the environment or population, and that the project is still ongoing.</p> <p><i>Is this project only Atafu or all Tokelau?</i></p> <p>Atafu is the priority at this moment because there are too many ants here. The other atolls are also here to learn and participate.</p> <p><i>A villager said the helpers are happy to help on this project and will be also happy to show where the ants are most abundant.</i></p> <p>A member of the Women's group said this is a big project ant that the women of the village are happy to help. She also asked if there was a budget available for female helpers to be paid. A Taupulega member said that the village should leave the budget to the Taupulega and that the village should focus on helping us.</p> <p>A comment from a villager; last time there were a lot of ants and now there are far less ants around. Can we treat the area differently and allocate resources to different work? They were told that the funds had been specifically assigned for management of yellow crazy ant, which is what was requested by Atafu.</p> <p>In the past villagers were paid by EDNRE to collect the queens and were paid \$2 per queen. Is it still on? No. Menny said there is no budget for this this year. The children will be told not to disturb the ant nests so the bait can kill them and they will not disperse around the village.</p> <p>We asked the reverend to pray, which he did, and the meeting was over.</p> <p>Fipronil information leaflets were handed out to attendees and they were made aware of the Warning posters that will be placed where management is taking place. We made it clear that if they have any concerns, we would be more than happy</p>
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			to answer them.
	Workshop: Health & Safety	25 helpers + EDNRE officers. Allan, Rafael and Viv presented. Warren recorded. Aokuso and Leuta translated	The presentation was delivered without PowerPoint because the electricity was still off. Health and safety protocols were explained and a brief demonstration of the baiting gear was given. Full training will be given tomorrow before baiting begins. They were told that we expect them to work daily from 6-11am and then from 2-4pm. Taupulega had a quick chat with the attendees and at the end told us that the 25 helpers will be available from tomorrow morning
	Warning signage	Rafael and Allan meet Leuta at EDNRE office to discuss talk about placing warning signage around the village. We asked Leuta to contact EDNRE officers to place posters around the village.	This action was completed within two hours. Posters were distributed throughout the islet by EDNRE officers and trainees.
	Pitfall traps	Allan, Rafael and Aokuso went to the 4 sites (AT1-4) and placed pitfall traps.	Warren recorded Rafael, Allan and Aokuso placing pitfall traps for inclusion in the PIAT. Aokuso asked several questions about the trapping and was proactive.
24 Jun Wednesday	06:00 start. Meet the helpers and EDNRE officers for tanning on the use of spreaders.	A great turn out. More than 25 people showed up, including the EDNRE officers.	Officers and villagers were trained. No issues arose regarding the baiting protocol and they all learned really fast how to spread the bait evenly using the spreaders.
	8:30 Baiting commences	A total of 6ha were baited by noon. Then, the baiting restarted at 2pm and they covered an additional 2-3ha. Warren recorded groups baiting and training.	FBA were happy with the workers selected by the Taupulega. All were hard working and focused. Some groups had more workers than spreaders. FBA alternated the positions of the workers so everybody could do a little and get trained. EDNRE officers were made group leaders (with an FBA person) and helped with translation. At the end of the day, Paul noticed that one of the empty buckets was missing. He told Rafael that some of the workers were asking to keep the buckets as they could use it to feed the pigs. Paul told them that this was not appropriate as there

			<p>would be bait +pesticide residue in the bucket. Paul would look closer into the bait log book and give Rafael feedback to confirm the bucket is missing. If so, Rafael will contact Sefo and try to find the person that has the bucket. FBA and PB will communicate to all the participants that they cannot keep the buckets. All of them must return to NZ/Samoa with us.</p> <p>FBA was not able to bait the Solar panel facilities as the gates were locked. Rafael will talk to Sefo and ask him to open the gates so FBA can enter in the area and also bait it. This will be only for a few minutes so they can spread the bait evenly on the area.</p> <p>Rafael will also discuss with Sefo the best way to move/contain the pigs in the pigsty so FBA can safely access the area. They will be treating the area soon. The plan is treat the surrounding area tomorrow and return to treat the pigsty afterwards in order to optimize time.</p>
	Bait stations checked	<p>The bait stations were checked one day after they were distributed.</p> <p>Recruitment to bait was poor.</p>	<p>After the first day using bait stations, it was noted that ants were not recruiting to baits as much as expected. However, on this second day of broadcast spreading, bait uptake was satisfactory. Several areas around the houses that have bait stations will be further treated with broadcast baiting.</p> <p>The Puleuku agreed that these areas can be treated as the ants are taking the bait really fast. He asked us to give him about 2 days so people can harvest the bananas and other ripe vegetables before we undertake baiting. Some women have requested Viv to go to their place and bait it. As we had no authorization from the Taupulega to bait all houses, only the ones that requested broadcast bating were done. Tomorrow, Rafael and Allan will talk to Sefo and organise this baiting around the village.</p>
	Talk to the children at school.	<p>Rafael, Allan and Viv explained that PB and FBA are on Atafu to work with the village on the control of YCA. Explained how the insecticide</p>	<p>The school children were really happy to have us there. The principal and all the teachers were also present at the chat we had with the children. One of the teachers provided translation. The children were aware of what we were doing</p>

		works. Told them that they should not touch the bait or the bait stations around the village. Warren filmed this.	<p>there and asked questions.</p> <p>Questions were: i) do the ants kill piglets and chickens? ii) what will the ants do to me? iii) what will happen if we touch the bait? iv) do you have a girlfriend?</p> <p>The teachers also asked questions and were participative. At the end, we took a picture with the children and Warren flew the drone and alerted them to stay away from the drone because it might fall over when flying around the village and could hurt them.</p>
	Collect pitfall traps and do card counts	At the end of the day Rafael, Allan, and Aokuso collected pitfall traps from the monitoring points and did card counts. Warren filmed this for inclusion in the PIAT.	<p>Aokuso was baiting the area with FBA, but later he gave us a ride to one of the monitoring sites and also did card counts with us. We asked him to join us because we will be training EDNRE officers to do it and he could then help us on demonstrating the procedure.</p> <p>During card counts Allan and Rafael noted that although there were lots of ants on the ground, not many crossed the card during the 30 second period. We recorded several zeros. However when looking around it was evident that there were a lot of ants in the area.</p>
25 Jun Thursday	Continue treatment. 07:00 start agreed by all.	12ha baited in the vao. The remaining areas that require baiting will be treated using blowers (because they are difficult to access using hand spreaders) or are areas that require spot specific treatment (e.g. solar panel area and pig sty).	<p>A smaller group was available for today's baiting (~15).</p> <p>Several workers were required to participate in other activities around the village including waste removal. There is a huge load of waste piled by the warehouse where the cargo arrives at the wharf. The waste has been removed and moved around the village with no pre-treatment. We have talked to them and explained that they might be moving ants around the village. The waste is sitting by the warehouse waiting for transport to Samoa. Viv, Allan and Rafael have discussed what could be done to reduce the likelihood of spreading ants around and will talk to Sefo about sprinkling bait on it.</p> <p>Paul and Aokuso had a chat with workers before the work started, and told the workers that buckets must be returned</p>

			and not used for feeding pigs.
	Meet Sefo to talk about issues/activities	Rafael and Viv met Sefo and discussed access to solar panel area and pigsties, broadcast baiting in the village, potential interviewees for filming and movement controls for rubbish brought from the vao into the village.	<p>Points Discussed:</p> <p>i) Access to solar power plant: The manager of the area is Helau. He will meet FBA tomorrow at 7am and open the gates so the FBA team can broadcast bait the area. Sefo commented that they have been spraying the power plant facilities with Mortein to keep ants away from the solar panels, cables and batteries. Also, he mentioned that Helau is happy that the area will be baited.</p> <p>ii) Pigsty: FBA can start baiting the area at any time. The families are aware of the baiting in the area and said that the pigs are not aggressive. As there will be villagers with them, they can ask the helpers/EDNRE to move the pigs from one pad to another if necessary.</p> <p>iii) Baiting around the village: The baiting was authorized by the mayor (Pulenuku - Faafetai). Sefo also agreed that the village should be baited. Rafael and Viv have told him that the product (Mortein: 0.7g/kg Imiprothrin and 2.0g/kg Cypermethrin) they have been using to kill YCA all around the village, including in the houses, last longer in the environment and can be more harmful to humans than Fipronil. The baiting around the village starts on Monday. This will give locals enough time to harvest their crops and the kids will be back at school.</p> <p>iv) Selected people for interviews about YCA in Atafu: The following villager were suggested: 1) Doctor Iuta; 2) Faafetai (Polunoku); 3) Sefo; 4) Helepa (She is the Fatupaepae – women’s group coordinator); 5) Fekei and Atene (Elder); 6) Elia (Elder).</p> <p>v) Waste sitting around the warehouse: it will be disposed in Apia. Viv and Rafael said this should be treated before it goes, otherwise they will take ants to the boat. Also FBA will place bait on the barge when the cargo movement from the wharf to</p>

			the boat is finished.
	Allan and Warren commence interviews for PIAT interview.	Interview with Bill (Lomi - builder)	Bill (Lomi) told engaging stories of the problems caused by the ants when they were at high abundance a few years ago. See video.
	Delivery of the first two workshops	Introduction to the project and to the PIAT delivered to 11 attendees: 3 EDNRE officers Leuta Tamoā, Christian Perez and Aokuso Vavega + 7 Taupulega Representatives / EDNRE trainees (Gogo Sakaria, Rimoni Fuiava, Sateli Teao, Fiamaua Toloa, Tefakalau Pelesa, Michael Josefi and Luta Pati) + Kelemenī (Menny) Tavuto. Aokuso and Christian translated.	Allan noticed that there were difficulties with language despite having Aokuso and then Christian translating. Strong engagement from Aokuso and Christian, with many questions about the Toolkit. It's worth noting that the attendees had been spreading bait in the vao for four hours before coming to these workshops. They were tired, but remained attentive. Warren filmed both workshops and the discussions afterwards. Aokuso asked for all the PowerPoint presentations and material we are using here.
	Pacific Biosecurity finalise Pre-Treatment Survey	Non-target monitoring completed. Allan and Rafael covered the 10 transects and surveyed for insects, birds, crabs, lizards, and spiders.	We noticed that the number of birds decreased from the far north end of the vao towards the pigsty. Conversely, the number of insects increased when moving from the far north end of the vao towards the pigsty. We observed lizards throughout the area and only one hermit crab was found at the far end of the vao.
	Met with FBA at the end of the day for an update on progress.	The bulk of the vao has now been baited. Some areas remain that will require more intensive treatment.	By the end of the day the villagers and FBA had completed spin baiting the vao. There are still several spots left to do (pig sty, solar array, village etc.) but the back of baiting the islet is very much broken. The locals have been fantastic and are now very worn out. FBA and PB are very happy with their engagement
26 Jun Friday	Smoking free day	Villagers were all engaged on this event. Parade started in front of the school and moved towards the meeting area outside the Taupulega	Pacific Biosecurity staff were not notified of this event until the night before. It was decided that FBA and PB staff would continue working rather than attending the festivities as the weather conditions remained favourable for baiting and we

		meeting house. Warren recorded the celebration.	could not predict the weather conditions for next week.
FBA bait Solar power area and pigsty	The Solar power plot was broadcast baited. The outer walls of the pigsty were baited with Vanquish and ATTRATHOR was applied to the trees in the pens of the pigsty. FBA sprayed ATTRATHOR out of reach of pigs.	<p>Rafael, Allan and Warren were waiting for FBA at the school from where the parade (smoking free day) started. Allan and Rafael went to the solar panel and pigsty with FBA. Warren covered the parade to get shots of the villagers and then met the team at the pigsty.</p> <p>ATTRATHOR was used on the trees, wall and divisions in the interior of the sty. It was sprayed approximately 1.5 metres above ground level using high quality squirter bottles with brass nozzles. One squirt was applied every three to four paces, or where a suitable surface was available. The ATTRATHOR is mixed 10ml per litre of water.</p> <p>When sprayed the water evaporates quickly and the residue is invisible. Paul demonstrated this by spraying directly on to a trail of workers carrying brood. The trail was disrupted momentarily, but reformed within a couple of minutes and carried on.</p> <p>Vanquish was used in crevices of the stone wall exterior of the pig sty. Vanquish was used instead of Xstinguish because the formulation of the matrix has increased carbohydrate and is more likely to be attractive to YCA. A fingernail sized blob of the paste was applied using a caulking gun every three or four paces. It is best to apply the paste into cracks and crevices or other sheltered areas because it can dry out and become less attractive. We observed rapid recruitment to the bait.</p> <p>Unfortunately, the villagers and EDNRE officers missed this part of the management. Allan and Rafael will arrange a day next week to demonstrate how to use Vanquish as an alternative treatment for sensitive areas such as the pigsty.</p>	
Allan and Warren revised shot list	Because there has been no delimiting and monitoring has not had extensive local engagement it	The shot list was revised and updated. This clarified which shots are required and what variants of each activity are required for editing later.	

		was decided to revise the shot list in order to stage certain management and monitoring activities for filming.	
27 Jun Saturday	Blower demonstration (FBA)	FBA gave a demonstration for EDNRE officers and representatives of how the blowers work and what can be achieved with them.	Paul led this activity. He explained what a blower is, the main components, and how to use this tool for the management of ants. He demonstrated all the steps from assembly, the fuel+oil mixture, and operating the blower to spreading bait. Paul explained that the blowers can blow the bait to the top of the trees and asked three attendees to try using the blowers. After the attendees tried the blowers the demonstration was finished.
	Bait cemetery areas of the vao with the blowers	FBA baited the dense areas in the cemetery and vao using the blowers and also re-visited several bush areas already baited to blow baits on the trees.	From this point, FBA will re-visit critical areas in the vao after the village is baited just to re-apply baits if required.
	EDNRE officers and Taupulega reps participate in filming with Warren and Allan	As no delimiting was done as part of this activity, we took the officers and reps into the vao to stage some delimiting activities for filming. This doubled as delimiting training as we explained why they were doing each activity, where they should look and how they should record what they found.	We took the attendees into the vao to film delimiting footage. Plenty of good shots were taken, but we will need to do pick-ups for use of GPS and improvised (plastic bag) flagging. Several good nest interior shots too - one with ants attacking a large spider. There was already evidence that the baiting is having an effect on the ants. Several trails of workers carrying brood were observed.
	Allan writes a paper for the Fakaofu Taupulega	In order to meet with the Taupulega of Fakaofu to discuss their ant management needs on the return journey, a paper was required to outline what would be discussed. Aokuso will translate and send to Hina once it is complete.	A one page paper was completed detailing the budget and timeframe of potential ant management work on Fakaofu and requesting information about the extent, abundance and priority of the YCA infestation there. Aokuso translated this and sent it to Hina.

28 Jun Sunday	We went to church early in the morning. EDNRE officers and Taupulega representatives came over to FB's accommodation later in the day for the last workshop: Introduction to Management.	Allan delivered the training and Rafael also participated. Warren filmed the proceedings. Attendees: Leuta Tamoia, Christian Perez, Aokuso Vavega, Gogo Sakaria, Rimoni Fuiava , Sateli Teao, Fiamaua Toloa, Tefakalau Pelesa , Michael Josefi and Luta Pati	At the end of the presentation we had a chat (+ food) with the participants. We asked what they think about the training and what they would like to learn more about. They have suggested: ant biology (Aokuso); Biosecurity (Leuta) and more visual information (Chris). The participants said the workshops are very informative and Luta said she wanted to learn more.
29 Jun Monday	Resume treatment around main village areas and buildings	The entire village was baited	We met with the villagers early in the morning and discussed what would be done today. One of the elders stood up and talked to all of the helpers and asked if we had a good weekend and said thanks for us to keep the Sunday and that he knows it might be hard for us to stay an entire day at home doing nothing, but that he hopes the rest was good so the work today can be resumed at full energy. FBA + helpers started baiting the village starting from the far end of the pigsty (border with the vao) and then moving towards the village area.
	Two FBA team members go to see the doctor accompanied by Rafael	Both FBA team members are unable to work today. Rafael covered for one of them during baiting.	Two FBA staff are sick (Paul and Chris). Rafael took them to the hospital for treatment. Dr. Iuta was very cordial and prompt. Neither of them has anything too serious and were medicated accordingly. Rafael talked to Dr. Iuta and he alerted us about cases of Dengue in Samoa. He also said that they will be spraying the village to prevent an outbreak as <i>Aedes aegypti</i> is now in Tokelau. Rafael and Paul have found mosquitos around the houses we are in. Dr. Iuta asked if we have been spraying the area and if the insecticide they use for fumigation would interfere with the ant management or vice-versa. Rafael and Paul said they would not. Rafael accompanied Paul and Chris back to their accommodation and joined the team baiting the village to

			cover Paul and Chris absence.
	Filming interview material for PIAT	Interviewees were located and filmed. Arrangements were made to film members of the Taupulega and baiting activities were filmed in between interviews	<p>Allan tried to arrange interviews with the people Sefo and Leuta suggested, but many were not willing to appear on camera.</p> <p>Warren and Allan recorded an excellent interview with Sefo and a less useful one with Richard Lel, a Fijian working on nuku business. Richard said that he never saw the ants and wasn't really aware that they are a problem.</p> <p>In between interviews we recorded shots of the ant management in progress. The work was progressing very quickly and it was difficult to capture good footage.</p> <p>Sefo informed he had arranged interviews with the Taupulega at 1:00pm, which ended up being 2:00pm. There were some issues with backlighting, but we were able to get several interviews. Subjects addressed included difficulty sleeping, working and collecting food because of the ants as well as some segments about the distraction caused to school pupils, changes in birdlife in the vao and the reduction in coconut crab abundance.</p>
	Rafael met with Sefo to discuss progress work	The village has been baited and all workshops have been completed. There is no longer a need for the visiting EDNRE officers and Taupulega representatives to stay on Atafu.	<p>We told Sefo that the entire vao area and village were baited and that all workshops and training had been delivered. Therefore, both the EDNRE officers and Taupulega reps could return to Nukunonu and Fakaofu on the boat coming to Atafu tomorrow (June 30th).</p> <p>Then Sefo told Rafael that the boat schedule had been modified and that PB/FBA would return to Apia on the 9th or 13th instead of 6th. He also told Rafael that 2-3 of our team would have to return to Apia on the boat leaving tomorrow. Rafael told him that he would talk to the team and get back to him on this regard.</p>
30 Jun	Organise return trip	Return trip was re-scheduled from July 6th to July 4th	Rafael went to EDNRE office early in the morning to clarify with Menny if there were any changes in the boat schedule. There

Tuesday			were no messages from the TALO office regarding changes in the boat schedule. Rafael and Menny called Asofa and Taufau. Taufau clarified that the trip was in fact anticipated, not postponed. She would send the email with the new boat schedule to Menny and Rafael later today when she had confirmation of the boat schedule. There were 9 places allocated for the team on this boat. However, there were 2 places available if any staff wanted to return on the boat today. Rafael talked to the team. All were happy with the arrangements. We have decided to return to Apia on the same boat.
	Filming and interviewing for PIAT	Interviews with Fekei, Dr Iuta and Nanesi Tupo	Warren and Allan got an excellent interview with the leader of the women's' group. She tells lots of horror stories about living with YCA and fills in the information that was unusable from the previous day's footage because of bad light. We interviewed the doctor at the hospital. Interestingly, he has seen a number of rashes that he was unable to establish the cause of. He was unaware that YCA spray formic acid, and suggested this as a possible cause of the rashes. We also interviewed a younger member of the village, who tells us of a village wide power outage caused by YCA entering the junction box and shorting the fuse.
	Planned Baiting of vao with blowers	Cancelled due to uncertainty about transport.	FBA had plans to re-visit a few sites in the vao today with the blowers. This activity was cancelled as FBA started packing because it would be possible that they would have to return to Apia today. After the return trip was organised, FBA postponed this activity for tomorrow morning.
	Rat bait training	Atafu EDNRE officers trained in the use of rat bait	Because of the uncertainty about departures and as it was far too hot to resume baiting (blowers), one of the FBA team offered to give Atafu officers training on rat baiting, as they knew we attempted to organise a rat baiting programme prior to ant management and it was not possible as EDNRE officers in Atafu were not prepared for it. Four EDNRE officers attended

			the workshop and placed rat bait stations around the warehouse, kitchen of the main building and supply storage facility. It was nice to see that the officers were able to correlate the similarities and differences between rat control and ant control. For example, that both use bait that contain something attractive to the pest, but that this attractant and the active is different. Also, they understood that the same biosecurity procedures apply for rats and ants, including movement control. If a rat baiting programme should be required in the future, the officers now have the knowledge to implement it.
	Ferry arrives and takes visiting EDNRE officers and Taupulega reps back	EDNRE officers and Taupulega reps depart.	The EDNRE officers and Taupulega reps from Fakaofu and Nukunonu leave on the ferry around 5pm. Warren gets some good footage of the ship being unloaded and a number of potential ant pathways (fruit, whiteware etc.) being brought ashore unchecked.
01 Jul Wednesday	Resume treatments in the vao	Treatment of the vao completed using blowers.	The heavily infested areas in the vao were baited again to ensure full coverage. Several patches of Pandanus that are poorly baited using hand spreaders were re-treated using blowers to ensure full coverage. Rafael and Allan also helped FBA. It is very hard work as the fully laden blowers weigh about 25kg, which, in the 36+degree heat is crippling - particularly as the engine gets hot and the padding against your back is plastic. We get started a bit before 9:00 and finished a little after 11:00. Rafael and Allan operated the blowers throughout this time.
	Cockroach treatment in public spaces	The School, public kitchens and hospital treated for cockroaches.	Meanwhile, the other members of the FBA team went to the school, kitchens and hospital and treat their cockroach infestations as a show of good will.
	Filming pick-ups of lost material	Lost training material re-shot.	Once we finished in the vao and had lunch, Allan and Warren head into town to do some filming. The EDNRE officer and trainees re-enact the spreader training. We get a good variety of shots with camera and drone, which should cut together

			nicely. We also filmed the filling, winding and adjustment material as well as some delimiting segments where sugar water is mixed and used for lure.
02 Jul Thursday	Complete treatment of pigsty	The pigsty was re-treated and all treatment completed.	Rafael and two FBA re-treated the pigsty using ATTRATHOR. The other staff were allocated to another task (outer island-below). Rafael and the 2 staff treated the inner and outer walls in the pigsty. At the end of treatment, one of the FBA staff stepped onto a sharp piece of rusty-old metal that went through his foot/shoes. He was wearing very strong-thick shoes. He was taken to the hospital. The nurse cleaned the injury and the doctor prescribed antibiotics. His tetanus vaccine is up to date. He is fine.
	Investigate outer islands initially with Warren, John and Alex from FBA and Michael, Tefakalau, Leuta and Luta from EDNRE Atafu. Then Paul subbed for Warren.	Four motu were visited: Motu fakakakai, which the EDNRE report indicated had YCA present. Motu fakakakai's neighbour on the right facing the Ocean (which is within walking distance), but I (Allan) didn't catch the name of. Malofuta, the motu with the well on it where Rafael reported seeing YCA last time he visited (Monica comment: note that Rafael made a mistake here - no other motu were visited in the last trip to Atafu. Rafael got confused with a motu we visited with Tumua on Nukunonu). Na Uta, which has the swamp taro pit.	Rafael and Allan talked to EDNRE officers about the situation of the outer islands. They told us that one of the islands has a few ants. EDNRE officers said the island was not larger than the southern area of the village (where most of the buildings are). Allan and Rafael decided that it would be beneficial to take 2-3 buckets of bait to the outer island and bait it to avoid ants returning to the village from there. Also, it would be an ideal opportunity to investigate how the EDNRE officer would react to a situation where they are in charge and have to deal with the problem themselves (like a final exam for them). Allan, Warren, 2 FBA and EDNRE officers went to the outer islands on two boats. After a few minutes, they returned because the engine of one of the boats died. The other boat towed the broken boat back to the village. Warren dropped off because he was concerned the recording equipment would be damaged by water splash on the boat ride. There was a delay while Allan looked for a lifejacket. Paul took over Warren's spot. The group visited 4 islets and found no ants. Allan asked the EDNRE officers to lead the searching and what they should do. All responded that they should delimit/monitor. One suggested

			<p>interim control with Mortein. Michael (a trainee) gave a perfect answer including the use of sugar lures. Generally the response was encouraging.</p> <p>No YCA were found on any of the outer motu visited. The bait was returned and placed in the EDNRE office.</p>
	Meeting the Taupulega	All staff met the Taupulega.	<p>The Taupulega said thanks for the work done and gave us all fans. Everybody said a few words. Overall the staff and the village were very happy with the outcomes of the project. This was the first time they talked about the continuation of the baiting programme. They look forward to having the team back in Atafu. Also, they stressed that Atafu is very enthusiastic with the results so far. Some of the elders told us that the ants are gone. One of them told Rafael that it is good to bring the fish back and fillet it without ants around. Allan and Rafael also said thanks for their hospitality and for the help provided. Also, we said that it is still too early to see all the benefits of this first baiting programme and that we expect that there will be a drastic reduction in the number of ants around. However, there are still several active nests in the vao and this is critical. There is a lot to be done and we wish Atafu to keep working and collaborating with PB. We had some food and drinks and then the night was over.</p>
03 Jul Friday	- FBA/PB packs equipment for return to Apia	FBA/PB started packing the equipment/cargo.	FBA/PB started packing and organising all payments for accommodation, food, petrol, etc.
	Allan asks Leuta to distribute and collect health surveys.	Leuta will distribute and collect health surveys.	We told Leuta about the health survey and why we are doing it. She will distribute the health surveys, collect them and keep it in a safe place until PB returns in November.
	Meeting with EDNRE officers / farewell	PB/FBA met with EDNRE officers and other villagers.	All were really happy with the results and excited about the continuation of this collaborative project. They look forward to have the team back in Atafu.

04 Jul Saturday	Follow up monitoring	Follow up monitoring was cancelled because we were told the boat was departing in the morning rather than the afternoon.	The plan to do monitoring in the morning prior to departure was abandoned after PB were informed that the boat would be departing at 11:00am rather than 5pm as we were told earlier. This misinformation led to a frantic scramble to settle our accounts and safely stow the bait before leaving. When it was realised that the boat was leaving as originally scheduled it was too hot for monitoring to be comparable with the pre-treatment measures
	Move bait and spreaders from the shed to EDNRE office.	Bait and spreaders were moved from the shed to the EDNRE office.	A total of 28 + 1/2 buckets of bait and 20 hand spreaders were placed in the EDNRE office. Rafael talked to Menny, Leuta and Kerat that the bait must be kept indoors all times. If they have any questions about the bait, they should email PB for advice. The air conditioning in the EDNRE office is no longer functioning, but the office remains comparatively cool and will offer a safer storage place for the bait and spreaders.
	Recap with FBA	PB discussed the achievements and issues the FBA team faced on this trip.	On balance it was agreed that the trip had been very successful. Logistical, health and safety and other issues were discussed and will be incorporated in a full report by FBA.
	FBA and Pacific Biosecurity staff return to Apia from Atafu	FBA and PB departed Atafu at approximately 6:30pm.	The FBA and PB team departed after what was a very successful round of management and filming. It will be interesting to see how the YCA populations fare in the future following this treatment.

Summary:

Positive outcomes:

Overall the management activity was a success. This was a great example of team work. FBA, PB, EDNRE, Taupulega reps and the village worked together well. The best evidence is the clear reduction on the number of YCA and the positive feedback we had from the entire village.

On a quick visit to the pigsty on the final day in Atafu, we observed an apparent 98% reduction of the numbers of YCA. We could not find an ant in the village. The places where we observed some ant activity (predominantly in the vao) are expected to exhibit lower ant activity over the next few weeks as workers and queens die.

Pacific Biosecurity and FBA were happy with the participation of the village and their enthusiasm for the management programme.

Negative outcomes:

It is not sensible to continue with management activity while cargo is brought on to the island on infested boats without biosecurity. The boats must be treated and the cargo inspected. Tokelau must implement biosecurity if they wish to reduce the risk of invasion by pests.

Pacific Biosecurity and FBA staff had some concerns about logistics, including storage of bait, accommodation and transport uncertainties, and financial aspects. These items will be addressed during meetings with EDNRE management.

7.7.2 November 2015

Date	Activity	Results	Outcomes
03 Nov Tuesday	Arrive Atafu	This activity was cancelled when it was discovered that Pacific Biosecurity staffs' places on the return sailing had been given away.	Training of EDNRE Staff in Monitoring protocols will be rescheduled. Training will be undertaken in Apia. No further Management activity will be undertaken until monitoring has been completed and its results assessed.
	Meeting with Taupulega		
	Meet Leuta and EDNRE trainees to discuss YCA activity since treatment and outline plan for this visit.		
	Prepare for visual delimiting survey		
04 Nov Wednesday	All day Visual delimiting survey		
	Pm Set pitfall traps and do card counts		
05 Nov Thursday	Am Continue visual delimiting		

	Pm Continue visual delimiting		
	Pm. Conduct ten post treatment monitoring transects		
	Pm. Collect pitfall traps		
06 Nov Friday	All day Continue visual delimiting survey		
07 Nov Saturday	Ant Identification workshop?		
08 Nov Sunday	No Work		
09 Nov Monday	Am Re-treat Pigsty area with ATTRATHOR and Vanquish if needed.		
	Pm All day broadcast bait in key areas if needed		
10 Nov Tuesday	Am broadcast bait in key areas if needed		
	Pm Exit meeting with Taupulega discuss findings actions and future actions		
11 Nov Wednesday	Am Discussions with Fatupaepae and the Aumaga		
	Pm Discussion with EDNRE and plan future activities.		

	Depart Atafu		
Summary: A massive waste of time and resources through no fault and out of the control of Pacific Biosecurity.			

7.7.3 December 2015

Date	Activity	Results	Outcomes
30 Nov Monday	Monitoring Workshop	Attendees: Leuta Tamoā, Kelemeni Tavuto A workshop was delivered on monitoring protocols	Both participants were attentive and commented on the value of the workshop to them.
	Follow-up Management Workshop	Attendees: Leuta Tamoā, Kelemeni Tavuto A workshop was delivered on Safe handling of baits and follow-up management.	Both participants were attentive and commented on the value of the workshop to them. There were some difficulties with retaining the application rates for the three chemicals
1 Dec Tuesday	Ant Identification workshop	Attendees: Leuta Tamoā, Kelemeni Tavuto	This workshop was well received, the practical elements using the PIAT key, microscope and specimens seemed particularly popular
2 Dec Wednesday	Recap of Monitoring Workshop	Attendees: Leuta Tamoā, Kelemeni Tavuto	Both participants seemed to have a good grasp of all monitoring techniques. A form was created and added to the "How to" hand-out to ensure data was recorded in a useable manner.
	Recap of Follow up Management workshop	Attendees: Leuta Tamoā, Kelemeni Tavuto	Generally both participants seemed to grasp the core concepts (particularly health and safety), but there was still uncertainty about bait application rates at the end of the session. Hopefully this uncertainty will be dispelled after the practical session at SPREP.
3 Dec Thursday	Practical work on Monitoring and follow up management in	Attendee: Leuta Tamoā A practical workshop on estimating bait application and monitoring distances was	Leuta did well, but seemed to struggle with measuring pace length and measuring application rates/

	SPREP grounds	conducted in the grounds of SPREP Apia.	
	Recap of Ant Identification Workshop	Attendees: Leuta Tamoia, Kelemeni Tavuto	A brief recap on the key elements of invasive ant biology and identification. The attendees displayed a good understanding of the concepts and an aptitude for ant identification
4 Dec Friday	Filming PIAT segment pick ups in SPREP grounds	Attendees: Leuta Tamoia, Kelemeni Tavuto (joined later). Pick up shots for the PIAT videos were filmed at SPREP	All footage was shot using Go Pro. While very portable, the inability to zoom is a disadvantage as is the extremely short battery life. That said all the required shots were collected and because of the camera's high resolution it should be possible to zoom in during editing where extra detail is required.
	Trainees give presentations on Monitoring and follow up treatment.	Leuta Tamoia gave two presentations. Kelemeni Tavuto did not attend	Leuta outlined both Monitoring and Follow up Treatment workshops and her retention was generally good. However, there was some still confusion about bait application rates and she will need some support and advice before attempting follow up management
	Suitcase handed over to Leuta and Menny to be taken to Atafu	The suitcase will be taken to Atafu on the next available sailing and will be stored in the EDNRE Office.	The Suitcase contained the following: <ul style="list-style-type: none"> • 1x bottle of ATTRATHOR Concentrate (opened and about ¾ full. • 5x 375 tubes of Vanquish Pro (sealed) • 3x 600ml coke bottles filled with Propylene glycol • 2x caulking guns • 2x spray bottles and nozzles • 1 box pens • 2x pencils • 2x permanent markers • 30x specimen jars • 2x trowels • 1x measuring jug • 1 pack of paper masks • 3x card count cards • 30x pink flags • 3x boxes nitrile gloves

			<ul style="list-style-type: none"> • 2x dissection kits • 3x copies of the Atafu Management plan (V 9) • 10x ant ID workshop slide printouts • 3x Pacific ant Identification Workshop manuals • 50x health surveys (Tokelauan) • 10x health surveys (English) • 50x warning pamphlets • 10 workshop feedback forms • 30x colour warning posters • 4x petri dishes
<p>Summary: Generally these sessions went well and uptake of information was good. Some confusion remained at the end of the sessions about measuring bait use and calculating application rates. A refresher course may be required before any wide scale management is undertaken independently.</p>			

7.7.4 April 2016

Monitoring results were received from Leuta Tamoia on Atafu as follows:

Date	Activity	Results	Outcomes
15 Mar 2016 All Day	Leuta Tamoia – (Environment Officer EDNRE Atafu) trained four personnel: Ruta Pelesa, Tefakalau Pelesa, Salome Toma and Toloa Hale in the monitoring protocols laid out in the December 2015 workshop in Apia as well as the key objectives for the project. These personnel will undertake all of the monitoring activity over the next seven (working) days.	All personnel now have a clear understanding of the monitoring protocols to be used and of the key objectives of project.	It is really good to see Ruta and Tefakalau returning to this project and to see Salome and Toloa joining it. This, in combination with the management training received in June last year increases the capacity for the people of Atafu to undertake monitoring and management of YCA.
16 Mar 2016 8:00- 11:00Am	Visual survey Track 1-13	Only five of the 13 tracks surveyed showed evidence of YCA. The ants appeared to be at low abundance with five or less observed on any one track.	Four of the five detections were on or near household debris. It is likely these objects provide refuge for the ants. EDNRE should talk with the owners of the objects and request that they are not moved. It would be useful to discuss whether the owners would be willing to have the objects treated with Vanquish Pro or ATTRATHOR in May. The hospital should be re-inspected in May and treated with Vanquish and ATTRATHOR to ensure YCA numbers stay low.
2:00- 4:30 Pm	Visual survey Tracks 14-20	Two of the seven tracks surveyed showed evidence of YCA. The ants appeared to be at very low abundance with three or less	The two detections were associated with Household objects and a canoe stored outside. It is likely these objects provide refuge for the ants. EDNRE should talk with the owners of the objects and request that they

		observed on any one track.	are not moved. It would be useful to discuss whether the owners would be willing to have the objects treated with Vanquish Pro or ATTRATHOR in May.
17 Mar 2016 8:00-11:00Am	Visual survey Tracks 21-35	Twelve of the fifteen tracks surveyed showed evidence of YCA. The ants appeared to be at low abundance with five or less observed on any one track. However, three of the tracks had multiple detections along their lengths.	Tracks 24, 26 and 28 all had multiple detections along their lengths. These detections were associated with coconut husks and new plants. It is likely this sort of debris is providing refuge for the ants. The objects should be assessed for possible making it a candidate for spot treatment with Vanquish Pro, ATTRATHOR and possible Antoff granules in May. EDNRE Officers should ensure that the debris in these track is not moved before treatment
2:00-4:30pm	Visual survey Track 36 (Rubbish area)	No YCA were detected in the track containing the rubbish area.	This is great news. However as rubbish is likely deposited here from all over the motu, it is suggested the area should be treated with Antoff granules in May to ensure that any newly introduced YCA are unable to get established in the area.
18 Mar 2016 8:00-11:00Am	Visual survey Visual survey Track 37-43	Evidence of YCA was only found on one track (#37). These ants were found in wood debri piled up outside a house. showed	The pile of wood debris in track 37 should be spot treated with Vanquish Pro and or ATTRATHOR in May. EDNRE officers should ensure that the wood is not moved from the area.
2:00-4:30pm	Visual survey Visual survey Track 44-49	No evidence of YCA found	This is excellent news.
Monday 21 Mar 2016	Sugar lures Track 1, 4-8, 15-17, 21	No evidence of YCA found, however other ant species were found to recruit to the lures.	If YCA were at sufficiently high abundance to warrant management action it is likely they would displace other ant species. This result is very encouraging.
Tuesday 22 Mar 2016	Sugar lures Tracks 32, 33, 35, 36, 38-49	No evidence of YCA found, however other ant species were found to recruit to the lures.	If YCA were at sufficiently high abundance to warrant management action it is likely they would displace other ant species. This result is very encouraging and suggests that only minimal management and ongoing monitoring is required.

Wednesday 23 Mar 2016	Pitfall traps	No evidence of YCA found, however other ant species were found in the traps.	If YCA were at sufficiently high abundance to warrant management action it is likely they would displace other ant species. This result is very encouraging and suggests that only minimal management and ongoing monitoring is required.
2:00-5:00 pm	Post treatment Monitoring transects	No evidence of any animal life (alive or dead) was recorded on any of the ten transects.	It is peculiar that there were no animals observed, but encouraging that there was no evidence of non-target poisoning in the form of dead animals.
Thursday 23 Mar 2016	Card counts	Card count results at all four sites were zero. In addition, no yellow crazy ants were observed on the ground surrounding the cards.	It appears YCA are absent from the four sites where the card counts were undertaken.
<p>Summary: The results of this monitoring study indicate that the 2015 management activity has achieved the project's objective of a 50% or greater reduction in YCA numbers by the end of year 3 (2017). The zero card count results are well below the threshold of an average of 30 YCA observed for further management to be initiated. However, monitoring of the ants must be maintained. As the majority of the YCA observed were on or near refuse, it is advisable to put movement controls in place to prevent their spread and for spot treatment of those areas to be undertaken before the refuse is cleared away.</p>			

7.7.5 May 2016

Date	Activity	Results	Outcomes
6 May Friday	Arrive Atafu	A funeral was being held in the morning.	Faleika Seiuli (the Taupulega secretary) greeted us and informed that we were free to do our work without meeting the Taupulega. She asked that we not work on the morning of the funeral and not work on Sunday morning. We agreed.
Am	Take gear to Accommodation	Gear taken to accommodation. Staying at Luisa and Lameka Sale's house.	Phone 22255.
Am	Preliminary visual survey of Southwest end of vao.	Small numbers of YCA were observed along the South wall of the pigsty along with other ant species (likely <i>Pheidole megacephala</i> and <i>Paratrechina longicornis</i>) and abundant blue tail skinks. No YCA observed around the fuel store, in rubbish area opposite Bill (Lomi)'s house or in the vao area where the new hotel is being built.	The YCA appear to be at very low abundance around the pigsty end of the vao and absent in the other places checked where they were formerly at high abundance. The ants are likely too sparse to consume a broadcast application of Antoff at the recommended application rate of 10kg/ha. It is advisable to treat the exterior of the pigsties with Vanquish Pro and to check the interior for YCA and, if necessary, treat the interior with ATTRATHOR.
Pm	Meeting with EDNRE Discuss and assess areas requiring spot treatment	<p>Leuta showed us a number of sites around the village where YCA were observed during the recent monitoring. Each of the sites had only a few YCA present.</p> <p>We then visited a patch of land between the cemetery track and the ocean, which had a significant infestation of YCA present. Leuta mentioned that this was where the highest abundance of YCA was observed during monitoring in March.</p> <p>A banana plantation behind the pulenuku's house where YCA were observed during monitoring in March was then searched. No</p>	<p>Leuta's phone number 22194.</p> <p>After some discussion, it was decided that there were too few yellow crazy ants present in the village area to warrant management with broadcast Antoff bait at this time. Similarly, as only one or two YCA were observed at any one site it is unlikely that the use of Vanquish Pro would result in sufficient poison accumulating in a nest to achieve knock down. The sites should continue to be monitored to see whether the YCA increase in number.</p> <p>There are still significant numbers of YCA present in the plot of land between the ocean and the track that leads to the cemetery. The ants are in sufficient abundance to</p>

		ants were observed.	need treatment with Antoff bait at a rate of 10kg/ha. This treatment was tentatively scheduled for Tuesday pending approval by the Taupulega. No YCA were observe in the banana plantation behind the pulenuku's house. No further action required.
7 May Saturday am	Assemble gear in EDNRE office in readiness for training/management on Monday	Three spray bottles, 4 caulking guns, 10 tubes of Vanquish and 1 bottle of ATTRATHOR ready to go. Plus flagging tape, 1 box of gloves and 1 bag of paper masks.	There is sufficient gear and toxicant to treat the pigsty area on Monday. However, because of the potential for rain to interfere with management plans it was decided that the area should be treated immediately.
pm	Treat pig pens with Vanquish-Pro	A team of three people (Monica Gruber, Meghan Cooling and Allan Burne) treated the perimeter wall of the pig pens with approximately two 325g cartridges of Vanquish-Pro	It was surprising that two cartridges of Vanquish were sufficient to treat the entire perimeter of the pig stys, as FBA used 10 325g cartridges in 2015). The process took approximately 45 minutes. The bait was applied in quantities equivalent to the end of a little finger at approximately three metre intervals in recesses that were close to the top of the wall. Very few YCA were observed on the walls and recruitment to the bait was predominantly by an unidentified black ant (likely <i>Paratrachina longicornis</i> – identification later confirmed by Meghan). The remaining Vanquish Pro, caulking guns and empties were returned to the EDNRE office.
8 May Sunday am	Church and rest in the morning. We spoke to Sefo about meeting with the Taupulega this evening rather than tomorrow morning.	PB went to Church. Sefo told us we should meet with the Taupulega tomorrow at 7:30am when the boat carrying the keyhole garden and Energy parties come in. As the other parties are on Atafu for one day only PB will likely be seen last.	We were made to feel very welcome by the people of Atafu and the singing was amazing. The service lasted 1 ½ hours and included singing by the children of the village in honour of mothers day
pm	Measure block of bush West of the	The block of bush west of the cemetery was measured (by PB Staff only) by pacing (1	This should be fairly rapid to treat with Antoff, though a dense area of bush at the East end may be problematic.

	cemetery that will be treated on Tuesday.	pace =~76cm) and GPS (unsuccessfully – only one satellite could be picked up). Pacing three of the four sides indicated the bush area was approximately 0.55ha and will require approximately 6kg of bait was (105 paces (79m) west side X 125 paces (~94m) south side and 45 paces (34m) east side (north ocean side not paced).	The area will require regular monitoring after treatment.
	Check interior of pig stys for YCA	The PB team of three people (Monica Gruber, Meghan Cooling and Allan Burne) searched the interior of the pig sty area for YCA. None were seen throughout the majority of the interior. One sty midway along the South wall had a nonu (noni) tree in it which had several YCA workers foraging on it. Looking at the base of the tree it was noted that there were workers carrying brood, probably in response to yesterday's round of treatment with Vanquish -Pro.	The sty on the south wall would benefit from treatment with ATTRATHOR along the main stem of the nonu (<i>Morinda citrifolia</i>) and around its base. The opposite side of the wall should be retreated with Vanquish.
9 May Monday am	Meeting with Taupulega	Monica spoke to the Taupulega about the project, explaining that ant abundance was too low for another round of full baiting and that we planned to do spot treatments in the few areas where YCA are still present in high numbers.	The Taupulega were generally very pleased with the project's progress. Some elders expressed their concerns that the ants were coming back. Based on subsequent conversations with these individuals, it appears that this was a reference to all ants and black ants in particular rather than yellow crazy ants.
pm	Pack suitcase with materials to be returned to New Zealand	Items to be taken back to NZ were packed into the suitcase.	The suitcase contains: <ul style="list-style-type: none"> • 2 spray bottles • Flags (unused) • Double sided tape (1 roll) • Flagging tape (1 roll) • An opened box of biros • ~6 conical bait stations(unused) • 1ground bait station (unused) • 20 pitfall traps containing specimens in

			<ul style="list-style-type: none"> propylene glycol • 2 caulking guns (unused) • 1 bottle ATTRATHOR concentrate (opened an 3/4 full) • 5 325g tubes of Vanquish Pro +nozzles (sealed) • Ant ID workshop manuals • Ant ID Workshop powerpoint and feedback sheets • 1 petri dish • 4 measuring jugs
pm	Clean Scott's Spreaders for return to NZ	Allan started cleaning Scott's spreaders. They required dismantling to clean thoroughly.	It may be difficult to achieve a level of cleanliness that is acceptable to NZ biosecurity. However, as the Antoff is neither dangerous goods or biologically active it may not be a problem.
pm	Brief Leuta in safe handling of Vanquish-Pro and ATTRATHOR and spot treatment around pig sty	Treated a nonu (noni) tree and surrounding area with ATTRATHOR in pigsty where a YCA nest was identified on Sunday. Treated exterior of wall with Vanquish Pro again.	This appeared to be the only portion of the pigsty where YCA were present in any numbers. It is hoped this treatment will be sufficient to knock down the nest that appears to be situated at the base of the nonu.
10 May Tuesday am	Clean Scott's spreaders and pack them ready for shipping. Separate 18 drums of Antoff for shipping back to New Zealand.	13 of the fifteen spreaders to be shipped were cleaned and boxed. 18 sealed Antoff containers were cleaned down labelled and stacked in the bench area of the EDRE office ready for shipping.	Today was a public holiday in Atafu in celebration of Mother's Day. Two spreaders will need to be cleaned tomorrow after they have been used to treat the bush by the cemetery area. This will bring the total to be shipped to fifteen.
11 May Wednesday am	Spreader treatments of Antoff in bush area running between the track leading to the cemetery and the ocean.	The team of nine people consisting of Leuta Tamoā, Ruta Pelesa, Tefakalau Pelesa, Alofa (EDNRE), Salome Toma, Toloa Hale (Taupulega representatives), Monica Gruber, Meghan Cooling and Allan Burne (Pacific Biosecurity) treated the cemetery area with approximately 6kg of Antoff bait	This treatment was comparatively quick (~ 1 hour). Slightly more bait was used than anticipated - possibly because of a minor spillage and a couple of newer members of the team.

am/pm	Check Ulu tree outside hospital and houses on the ocean side of the motu which reportedly have high numbers of YCA	There were indications that coral wall at the base of the ulu (<i>breadfruit/Artocarpus altilis</i>) tree in front of the hospital contained a small nest of YCA. The base was treated with Vanquish Pro at 3 m intervals around its circumference and the trunk of the tree was sprayed with ATTRATHOR where YCA were seen trailing. YCA were found in low numbers (< 5 per house) around five houses. Two houses had YCA present in numbers indicative of a nest site. One of these houses had a sleeping area with rubbish underneath it, which appeared to be the source of the infestation and was treated with Vanquish Pro and ATTRATHOR. The other house had a compost area that was infested, which was treated with Antoff (approx. 250g). YCA were seen removing the Antoff immediately.	Generally, the ants observed around the ocean side dwellings were in numbers too low to warrant baiting. Ongoing monitoring of these areas was advised. The two higher abundance infestations were treated with a combination of ATTRATHOR, Vanquish -Pro and Antoff respectively. This treatment doubled as training for the EDNRE assistants and Taupulega representatives.
pm	Clean and pack last spreaders and pack used gloves etc.	The last two spreaders were cleaned and boxed ready for shipping and the used gloves and Vanquish Pro cartridges and packets were sealed in a plastic bag inside the newly emptied ANTOFF drum and packed in the suitcase.	It is advisable to email Biosecurity NZ from Samoa to let them know the dirty gear is being brought in to NZ.
12 May Thursday	Finalise packing of gear to be shipped to New Zealand	Finalised packing of gear to be shipped to New Zealand	This was essentially a rest day as all treatment and monitoring had been done. All items for shipping back to New Zealand are now packed and ready to go.
13 May Friday am	Exit meeting with Taupulega	PB met with the Taupulega who generally expressed satisfaction with the project outcomes. PB informed the Taupulega that the bulk (18x12.5kg drums) of the Antoff bait was to be removed from Atafu and shipped back to New Zealand because the cooler climate should extend its useful life.	Generally the Taupulega were pleased with the progress of the project and glad that it is to continue until 2019. Some concern was again raised about black ants observed entering houses, though no specific nuisance or hazards associated with the ants were mentioned. PB told the Taupulega that they had collected samples for identification and would advise on appropriate treatments the people of Atafu could use to keep the

			<p>ants out of their houses.</p> <p>It appears that the problems caused by YCA have created a tendency to view all ants as a potential source of problems.</p> <p>The Taupulega were agreeable to the bait being returned to New Zealand.</p> <p>One of the elders appeared concerned that PB had travelled from New Zealand to work for one day on Atafu and asked whether this was a sustainable use of the project's budget. Presumably the elder had assumed that as PB only required local help for one day (to bait the cemetery and surrounding area) that only one day's work had been done. The reality was that PB had worked the weekend and public holiday attending to the ant management.</p>
pm	Exit meeting with EDNRE	We discussed with Leuta what was being left behind for future spot treatments and what was for use on Nukunonu	<p>For future management of YCA on Atafu or Nukunonu EDNRE Have been left with:</p> <ul style="list-style-type: none"> • 10 sealed and 1 open buckets of Antoff • 4 Scott's spreaders • 3 boxes of Nitrile gloves • 2 unopened 325g tubes of Vanquish Pro • 2 opened 325g tubes of Vanquish Pro in 2 caulking guns • ~1litre of mixed ATTRATHOR. • 1 pack of paper masks.
Pm	Survey of outer motu.	<p>PB and Leuta Tamoia accompanied by Leuta's brother and Julie (a polica officer) returned to the motu where YCA had been reported last year. The motu visited were:</p> <ul style="list-style-type: none"> • Motu fakakakai, which the 2015 EDNRE report indicated had YCA present. 	<p>It was encouraging that there were no YCA on these outer motu, which are used for picnics and sleepovers during holidays. There were, however, very high numbers of Pacific rats present. The rats appeared devoid of fear for humans.</p>

		<ul style="list-style-type: none"> • Na Uta, which has the swamp taro pit. No YCA were found on either of these motu.	
14 May Saturday	Catch the boat	Caught the boat at approximately 4pm.	
<p>Summary: This trip indicates success on many levels. The EDNRE March 2016 monitoring report was accurate and well executed for YCA detection, suggesting that the staff on Atafu no longer require outside assistance with YCA monitoring. The zero counts recorded in the post treatment monitoring for environmental effects, however, were not supported by PB's observations in the vao – skinks and hermit crabs were highly abundant, as were orb web spiders. Black (likely <i>P.longicornis</i>) and brown (likely <i>P.megacephala</i>) ants were also obvious throughout the inhabited motu.</p> <p>The objective of the project was to reduce YCA numbers to below 50% of the abundance at the outset of the project, with patches where the ant was absent. This has clearly been achieved by the 2015 treatment. Spot treatments with Vanquish-Pro and ATTRATHOR of areas where YCA persisted at treatable numbers doubled as refresher training for EDNRE staff and Taupulega representatives.</p> <p>Concern was expressed by the Taupulega about black ants entering homes, though no specific nuisance or hazard posed by the ants was reported. While the scope of the project does not include control of ant species other than YCA, PB collected samples of these black ants for identification (<i>Paratrechina longicornis</i>) in order to suggest appropriate control measures that may be implemented by village residents.</p>			

7.8 Appendix 8. Monitoring results

7.8.1 Management and monitoring 2015

7.8.1.1 Pre-treatment monitoring June 2015

7.8.1.1.1 Non-target effects

A record of the number of living or dead individuals of each of six taxa encountered on ten 100 metre transects prior to treatment. N.B. Yellow crazy ants encountered were not recorded in the insect category.

Taxon	Crab	Spider	Insect	Lizard	Bird	Fish
Transect						
T1 Alive	0	0	12	3	4	0
T1 Dead	0	0	0	0	0	0
T2 Alive	0	1	17	4	3	0
T2 Dead	0	0	0	0	0	0
T3 Alive	1	1	9	3	4	0
T3 Dead	0	0	0	0	0	0
T4 Alive	0	1	18	2	0	0
T4 Dead	0	0	0	0	0	0
T5 Alive	0	10	32	10	0	0
T5 Dead	0	0	0	0	0	0
T6 Alive	0	6	15	10	0	0
T6 Dead	0	0	0	0	0	0
T7 Alive	0	5	13	7	0	0
T7 Dead	0	0	0	0	0	0
T8 Alive	0	2	13	6	1	0
T8 Dead	0	0	0	0	0	0
T9 Alive	0	9	39	3	0	0
T9 Dead	0	0	0	0	0	0
T10 Alive	0	7	58	0	0	0
T10 Dead	0	0	0	0	0	0

7.8.1.1.2 Pitfall Traps

Placed 23rd June 2015, collected 24th June 2015

Site	trap	Species				
		<i>A.gracilipes</i>	<i>Cardiocondyla</i> sp.	<i>Monomorium</i> sp.	<i>Pheidole</i> spp.	<i>Tetramorium</i> spp.
AT1	TA	11			1	
AT1	TB	1				
AT1	TC				1	
AT1	TD					
AT1	TE					
AT2	TA	2				
AT2	TB	1				
AT2	TC	1				
AT2	TD	1				

AT2	TE	4			1	
AT3	TA	4		2		
AT3	TB	2			1	1
AT3	TC	3	1		1	
AT3	TD	2			1	
AT3	TE		2			1
AT4	TA	146			1	
AT4	TB	4			5	
AT4	TC	16		1	3	
AT4	TD	6			3	1
AT4	TE	2				1
	TOTALS	206	3	3	18	4

7.8.1.1.3 Card Counts

Site	Position	Transect A	Transect B	Transect C
AT1	P1	4	2	0
AT1	P2	0	1	0
AT1	P3	0	11	0
AT1	P4	0	0	0
AT1	P5	0	0	1
AT1	P6	0	1	0
AT1	P7	1	0	0
AT1	P8	0	4	0
AT1	P9	0	0	0
AT1	P10	0	0	0
AT1	P11	0	0	3
9.7	←AVERAGE TOTALS →	5	19	4
AT2	P1	0	0	0
AT2	P2	0	0	1
AT2	P3	0	3	0
AT2	P4	0	3	0
AT2	P5	0	0	0
AT2	P6	0	0	0
AT2	P7	1	1	0
AT2	P8	0	18	1
AT2	P9	0	0	0
AT2	P10	0	0	0
AT2	P11	0	0	1
9.7	←AVERAGE TOTALS →	1	25	3
AT3	P1	0	0	5
AT3	P2	0	2	0
AT3	P3	0	0	0
AT3	P4	0	63	0
AT3	P5	0	1	0
AT3	P6	0	0	0
AT3	P7	0	1	0
AT3	P8	0	0	0
AT3	P9	8	0	0
AT3	P10	0	1	0
AT3	P11	0	0	1
26.7	←AVERAGE TOTALS →	8	68	6

AT4	P1	1	1	0
AT4	P2	0	0	0
AT4	P3	0	0	0
AT4	P4	0	0	2
AT4	P5	0	0	0
AT4	P6	1	2	0
AT4	P7	0	0	0
AT4	P8	0	0	6
AT4	P9	0	0	0
AT4	P10	2	1	5
AT4	P11	6	6	0
11	←AVERAGE TOTALS →	10	10	13

7.8.2 Management and monitoring 2016

7.8.2.1 Post-treatment monitoring March 2016

7.8.2.1.1 Non-target effects

A record of the number of living or dead individuals of each of six taxa encountered on ten 100 metre transects prior to treatment. These transects were checked between 2:00 and 5:00pm on the 23rd of March, 2016. N.B. Yellow crazy ants encountered were not recorded in the insect category.

Taxon	Crab	Spider	Insect	Lizard	Bird	Fish
Transect						
T1 Alive	0	0	0	0	0	0
T1 Dead	0	0	0	0	0	0
T2 Alive	0	0	0	0	0	0
T2 Dead	0	0	0	0	0	0
T3 Alive	0	0	0	0	0	0
T3 Dead	0	0	0	0	0	0
T4 Alive	0	0	0	0	0	0
T4 Dead	0	0	0	0	0	0
T5 Alive	0	0	0	0	0	0
T5 Dead	0	0	0	0	0	0
T6 Alive	0	0	0	0	0	0
T6 Dead	0	0	0	0	0	0
T7 Alive	0	0	0	0	0	0
T7 Dead	0	0	0	0	0	0
T8 Alive	0	0	0	0	0	0
T8 Dead	0	0	0	0	0	0
T9 Alive	0	0	0	0	0	0
T9 Dead	0	0	0	0	0	0
T10 Alive	0	0	0	0	0	0
T10 Dead	0	0	0	0	0	0

7.8.2.1.2 Pitfall Traps

Placed 23rd March, 2016, collected 24th March 2016

The results received in the YCA monitoring report 2016 did not include identifications of ant species caught in pitfalls. However, it was stated that no yellow crazy ants were caught in any of the pitfall traps at any of the sites. The pitfall traps were checked and ants identified to genus level by Meghan Cooling when Pacific Biosecurity team return to Wellington after the May 2016 visit.

Site	trap	Species						
		<i>A. gracilipes</i>	<i>Cardiocondyla</i> sp.	<i>Monomorium</i> sp.	<i>Paratrechina</i> spp.	<i>Pheidole</i> spp.	<i>Tapinoma melanocephalum</i>	<i>Tetramorium</i> spp.
AT1	TA				1	9		1
AT1	TB	1				4		
AT1	TC					8		
AT1	TD							
AT1	TE			1		10		
AT2	TA				3			
AT2	TB				7	5		
AT2	TC			1	3	3		
AT2	TD				4	2		
AT2	TE				2	3		
AT3	TA					4		
AT3	TB			1		14	1	
AT3	TC					5		
AT3	TD			2		19		
AT3	TE					5		
AT4	TA					6		
AT4	TB					5		
AT4	TC			1		3		
AT4	TD					8		
AT4	TE					1		
	TOTAL	1	0	6	20	114	1	1
	BEFORE	206	3	3	0	18	0	4
	% change	-99%	-100%	+100%	+1000%	+500%	-90%	-75%

% change = difference in abundance since management.

7.8.2.1.3 Card Counts

Results for the card counts conducted on 24 March were all zero. The report stated that in addition zero records on the cards, no YCA were observed around the cards at any of the sites, which was in contrast to the card counts performed in June 2015. The visit in May 2016 confirmed that ants were absent from the transect areas.

Site	Position	Transect A	Transect B	Transect C
AT1	P1	0	0	0
AT1	P2	0	0	0
AT1	P3	0	0	0
AT1	P4	0	0	0
AT1	P5	0	0	0
AT1	P6	0	0	0
AT1	P7	0	0	0
AT1	P8	0	0	0
AT1	P9	0	0	0
AT1	P10	0	0	0
AT1	P11	0	0	0

	←AVERAGE TOTALS →	0	0	0
AT2	P1	0	0	0
AT2	P2	0	0	0
AT2	P3	0	0	0
AT2	P4	0	0	0
AT2	P5	0	0	0
AT2	P6	0	0	0
AT2	P7	0	0	0
AT2	P8	0	0	0
AT2	P9	0	0	0
AT2	P10	0	0	0
AT2	P11	0	0	0
	←AVERAGE TOTALS →	0	0	0
AT3	P1	0	0	0
AT3	P2	0	0	0
AT3	P3	0	0	0
AT3	P4	0	0	0
AT3	P5	0	0	0
AT3	P6	0	0	0
AT3	P7	0	0	0
0AT3	P8	0	0	0
AT3	P9	0	0	0
AT3	P10	0	0	0
AT3	P11	0	0	0
	←AVERAGE TOTALS →	0	0	0
AT4	P1	0	0	0
AT4	P2	0	0	0
AT4	P3	0	0	0
AT4	P4	0	0	0
AT4	P5	0	0	0
AT4	P6	0	0	0
AT4	P7	0	0	0
AT4	P8	0	0	0
AT4	P9	0	0	0
AT4	P10	0	0	0
AT4	P11	0	0	0
	←AVERAGE TOTALS →	0	0	0

7.8.2.1.4 Visual Survey

The visual survey was conducted between 16 and 18 March, 2016 with five personnel spaced at 10 metre intervals across 50 metre wide survey tracks each running from the lagoon side to the ocean side of the motu.

Day /Time:	Track #	Location Notes	Sugar lures (Y/N)	Abundance	Notes
Day 1- 8:00 – 11:00am	1	Starting point- Bulk store to the Matalele	Y	0	No YCA
	2	Pa o Filipino to the other bulk store (1 detection)	N	5	Small house at Hemu's pa under wood debris

	3	Mataio's house to Kehias pa (1 detection)	N	2	Outside Atene's house
	4	Emele n Tiu's house to Papa's House	Y	0	No YCA
	5	Fita's house	Y	0	No YCA
	6	Samalia's house	Y	0	No YCA
	7	Kaleti's house	Y	0	No YCA
	8	Vahi's house	Y	0	No YCA
	9	Stan's house	N	0	No YCA
	10	Mauhali's house	N	5	Underneath lying house objects near the house
	11	Malala's house	N	0	No YCA
	12	Hospital (1 detection)	N	4	Around hospital's ulu tree
	13	Suia's house detections)	N	5	1)Under Cooking house 2) Plant debris
2:00 – 4:30 pm	14	Tota's house (1 detection)	N	2	Near shore, under canoe
	15	Ave's house	Y	0	No YCA
	16	Vakula	Y	0	No YCA
	17	Motu-tukehe	Y	0	No YCA
	18	School	N	0	No YCA
	19	Levi's house	N	0	No YCA
	20	Tulano's house (1 detection)	N	3	Underneath house objects outside
Day 2- 8:00- 11:00am	21	Hefo's house	Y	0	No YCA
	22	Bush area (1 detections)	N	5	1)Around banana plantations
	23	Akes house (1 detection)	N	3	Umu (around cooking house
	24	Bush area (2 detection)	N	2	Around baby plants
	25	Tava 's house	N	4	Under lying objects
	26	Bush area (2 detections)	N	4	1)Empty house 2) Under coconut husks
	27	Bush area (1 detection)	N	3	Around well
	28	Bush areas in cemetery Track 1 (4 detections)	N	5	Under coconut husks
	29	-	N	5	Under coconut husks
	30	-	N	5	Under coconut husks
	31	-	N	5	Under coconut husks
	32	Bush area on the other side of the cemetery	Y	0	No YCA
	33	- Track 1	Y	0	No YCA
	34	Sakalia's house	N	4	Underneath piles of coconut husks

	35	Luisa's house	Y	0	No YCA
2:00 - 4:30pm	36	Rubbish area	Y	0	No YCA
Day 3 8:00 - 11:00 am	37	Lomi's house (1 detection)	N	4	Wood debris outside house
	38	Vao area	Y	0	No YCA
	39	- Track 1	Y	0	No YCA
	40	- Track 2	Y	0	No YCA
	41	Petrol area	Y	0	No YCA
	42	Vao area	Y	0	No YCA
	43	T1	Y	0	No YCA
2:00 - 4:30pm	44	T2	Y	0	No YCA
	45	T3	Y	0	No YCA
	46	T4	Y	0	No YCA
	47	T5	Y	0	No YCA
	48	T6	Y	0	No YCA
	49	Motu loa	Y	0	No YCA