

Management Plan for Tuvalu

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Monica Gruber	Revision v2: incorporating training and treatment of Te Puka motu, Funafuti. Increased emphasis on minimising use of pesticide (single treatment only, larger buffer zone)	25 Apr 2017

1 Purpose and approach

The purpose of this Management Plan for Tuvalu is to provide resources for all the activities required to manage multiple incursions of yellow crazy ant (*Anoplolepis gracilipes*) in inhabited and conservation environments. The Management Plan is based on best practice, but has been tailored to reflect the resources available in Tuvalu.

The goal of management is to reduce the abundance of the yellow crazy ant in Tuvalu with a single treatment of fipronil based bait on each islet, followed by two years of monitoring. The Management Plan also provides a way to record the results of management activities, and may be revised as needed based on progress (adaptive management).

The plan incorporates the SPC General Emergency Response Plan for Invasive Ant Incursions 2008, and Environmental and Social Impact Assessment (for Kiribati and Tokelau, but equally applicable to Tuvalu). 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 management in Tuvalu includes yellow crazy ant infestations on Funafuti atoll (specifically Fongafale and Fualopa islets) and Nukulaelae atoll (specifically Fangaua, Motala and Tumiloto islets) and some parts of Niulakita Island. This scope is based on the survey of YCA on Tuvalu conducted by Vaqalo et al. (2014).

The activity for which this management plan has been drafted will be confined to Fualopa (which will be treated as a training exercise for MNRL Agriculture Staff and SPC) and Motala (Figure 1.) which will subsequently be undertaken by MNRL Department of Agriculture staff independently. However, the protocols in the plan can be applied anywhere in Tuvalu.

The first treatment in April 2017 will be undertaken in Fualopa.

The *temporal scope* of management (timeline) is open and to be decided by MNRL Tuvalu, based on available resources and need.

Further detail on the spatial and temporal boundaries of management can be found in Vaqalo et al. (2014).

Pacific Biosecurity will provide full training for treatment and monitoring of yellow crazy ant, and assumes that Tuvalu MNRL will undertake further treatment on other motu according to the protocols and meeting all environmental and social impact mitigations. Tuvalu MNRL are free to change the scope of management as required.

It is very strongly suggested that the Kaupule use the treatment methods outlined here only as necessary. Pacific Biosecurity strongly recommends that treatment is only undertaken on inhabited motu. Whether undertaken on inhabited or uninhabited motu,

only one treatment should be applied within a ten year period. We recommend this restriction as the long term effects of pesticides and their fate in the environment is an on-going question that we do not have definitive understanding of.

Pacific Biosecurity is not overseeing the entire management programme. As a result Pacific Biosecurity takes no responsibility for any environmental impact that arises as a result of the pesticides described in this plan being used without strict adherence to the advice given here, not in accordance with best-practice training or without regard to the ESIA.

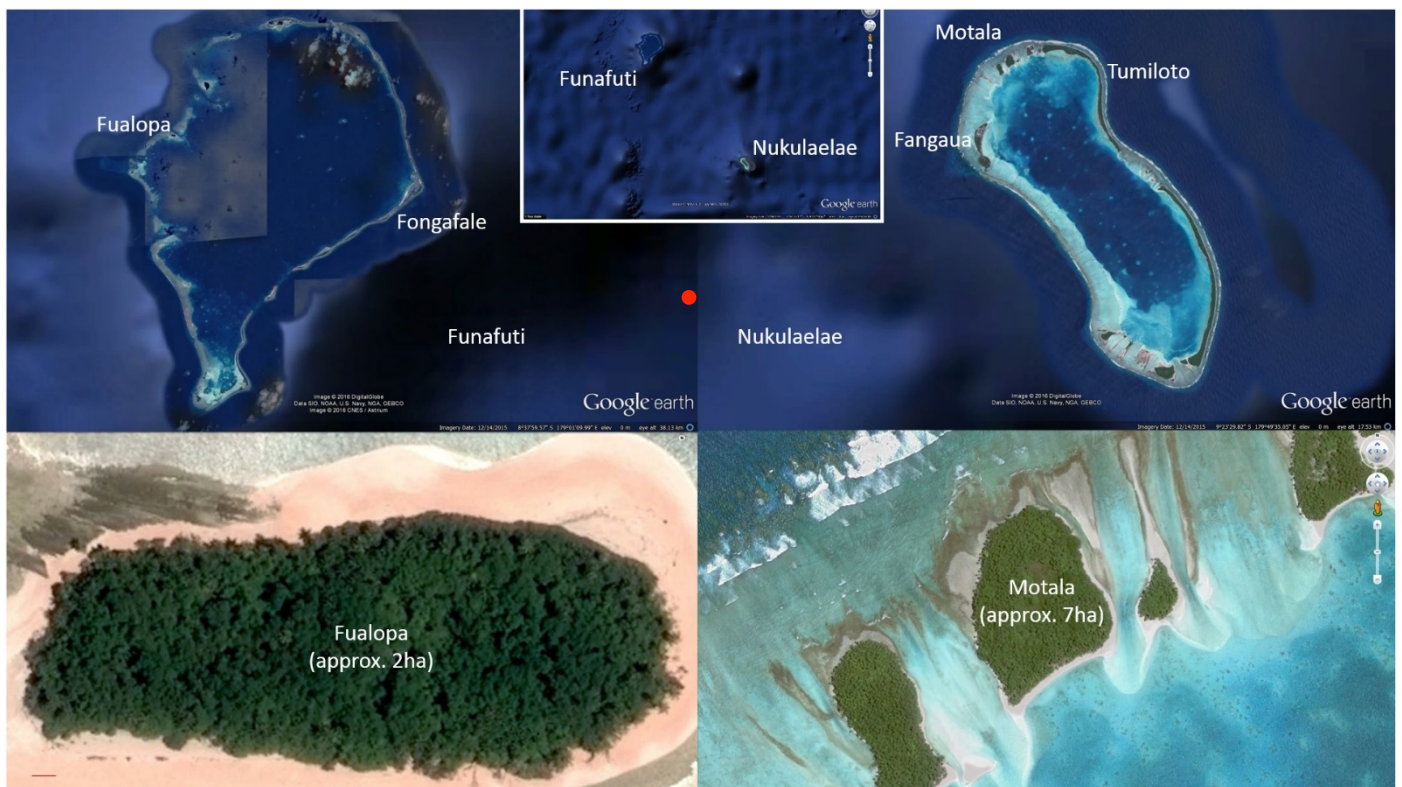


Figure 1: Map showing Funafuti and Nukulaelae atolls, Tuvalu. A survey conducted in October 2014 (Vaqalo et al.) recorded Yellow crazy ant on Fongafale (main inhabited islet) and Fualopa conservation islet on Funafuti atoll and Fangaua (main inhabited islet), Motala (conservation islet) and Tumiloto (a popular picnic site) islets. Yellow crazy ants were also found on some parts of Niulakita Island approx 160km SSW of Nukulaelae (not shown). The current management plan focuses on delimiting and treatment on Fualopa islet Funafuti and Motala islet Nukulaelae.

2.2 Progress recording and adaptive management

As the management activities progress, their outcomes are intended to be summarised here, and changes incorporated into the Management Plan.

Table 1: Timeline of management activity on Tuvalu. It will be used to plot the progress of treatment and to record changes after re-evaluation of each step. Appendices 7 and 8 contains detail of each treatment and monitoring event, which is then briefly summarised here.

Date	Activity	Results	Outcomes
April 2017	MNRL / SPC training and Fualopa treatment.	MNRL and SPC staff were trained. Yellow crazy ants in Fualopa were at too low abundance to be treated so Te Puka was treated. ~ 8 Ha were treated on Te Puka.	Three days after treatment yellow crazy ant abundance was measured using card count index and had declined from 420 to 16 (i.e. below 37, the level at which treatment is considered desirable. MNRL staff will lead further treatments on other motu (only when card count indexes exceed 37). A single treatment per motu only is advised for any future management work.

3 Communication Plan

3.1 Stakeholders

The primary Stakeholders have been identified as:

- MNRL Agriculture Staff
- Kaupule, residents and business owners of Fongafale, Funafuti and Fangaua, Nukulaelae.
- Questions to consider regarding stakeholders for future treatments (Motala etc.): Are the conservation and picnic islets owned by a particular family? Are crabs or other species harvested from any of the infested areas? Is taro or any other crop grown on any of the infested islets? No-take periods of 3 months should be imposed in these situations

3.1.1 Roles and responsibilities of parties

Organisation and Role	Responsibilities
Pacific Biosecurity • Training Activity Leader	<ul style="list-style-type: none"> • Undertake training in treatment and monitoring on Funafuti Atoll with practical training being undertaken on Fualopa Islet • Ensure appropriate parties (e.g. residents or business owners on Funafuti) are fully informed about the incursion and how it might spread. • Ensure all safety and mitigation measures are followed • Maintain professional practice • Report outcomes of monitoring as described here • Comply with local law and cultural expectations • Ensure effective communication • Ensure that logistic requirements are met
MNRL Agriculture Staff • Support treatment on Fualopa • Lead later treatment on other atolls • In-country logistics and liaison	<ul style="list-style-type: none"> • Ensure staff participate in treatment and monitoring training on Fualopa • Ensure staff trained on Fualopa conduct management activity on Motala islet • Undertake monitoring independently (3 years) • Ensure residents and business owners are fully informed about the incursion and how it might spread. • Comply with the safety and environmental / social impact guidelines • Adhere to the instructions given by Pacific Biosecurity • Raise concerns with appropriate parties • Report concerns to Pacific Biosecurity • Ensure effective communication • Ensure that logistic requirements are met
SPC staff	<ul style="list-style-type: none"> • Participate in treatment and monitoring training on Fualopa • Ensure all safety and mitigation measures are followed • Maintain professional practice • Comply with local law and cultural expectations • Ensure effective communication
Residents and business owners on Funafuti and	<ul style="list-style-type: none"> • Support the Activity • Comply with the safety guidelines • Raise concerns with appropriate parties

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 (0.01ppm/10mg/kg) – no effects have previously been reported in association with the Antoff granular bait being used in the current Activity. 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 day to day activities- both Fualopa and Motala have been designated conservation islets, thus it is unlikely that they will be the centre of the day to day business of residents or businesses. A team of up to seven people will be distributing Antoff bait using manual spreaders and will be moving constantly. If visitors to the islets are present, it is unlikely there will be significant disruption to day to day activities. A 3 month no access period should be applied to the treated motu
- Non target poisoning (domestic animals and wildlife) – it is unclear whether there are domestic animals on either of the islets. It is not known whether crabs may be harvested from these islet. If harvesting from either site is usual a 42 day withholding period must be enforced after treatment. Fipronil is toxic to a wide variety of beneficial invertebrates including crabs and spiders. Cats and birds are unlikely to be affected as the baits contain extremely low concentrations of poison (0.01g/kg). However, caution should be exercised in allowing domestic animals (such as chickens and cats) to roam freely in the treatment area.
- Contamination of water or lagoon - Fipronil is highly toxic to fish and marine invertebrates such as crabs. However, the Fipronil 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 bait. This includes:

- Appropriate personal protective equipment (PPE) will be distributed to all participants. Because the granular bait is being distributed using mechanical spreaders filled using scoops, nitrile gloves are the only PPE deemed necessary for this operation.
- In addition to briefing all stakeholders, warning posters in both English and Tuvaluan will be distributed around the treatment area.
- Timeline of management activity- it is anticipated that each application of bait will take a maximum of one day. The baiting team will be moving constantly, so it is unlikely their presence will cause any disruption to local day to day activities. Similarly, it is estimated that Delimiting and Monitoring will take no more than one day each.

- Use of Antoff granular baits – because of the low concentration of Fipronil in this bait, it is unlikely that any domestic animal, native bird or reptile would be able to consume sufficient bait for the toxin to have an effect on them. Such animals would need to consume approximately their own body weight of Antoff to have a noticeable effect.
- Buffer zone near water and application during dry season – a buffer of 10 metres is being observed around the edge of all open water where no bait will be applied on the ground). In addition, the bait will be applied during the dry season to mitigate against the possible effects of rain washing the toxin into the lagoon.

In addition to briefings, signage (Appendix 1. Warning poster for Antoff Fipronil treatment) in Tuvaluan and English will be distributed around the treatment area.

3.2 Community awareness

To limit the spread of yellow crazy ant, in accordance with the Surveillance and containment plan, awareness materials will be distributed to community members.

3.2.1 Key messages

The key messages that need to be conveyed to the community 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 ant to spread: rubbish, fresh produce, passengers and their belongings, pipes, timber, machinery and vehicles that have been parked for a long time in high risk areas.
- Who to contact if an ant is discovered. Appoint a central officer or group that community members can contact if they detect something suspicious
- Prevention is better than cure! Stress that anything being moved from a high risk area must be checked or treated before departure.

3.3 Delimiting and baseline data gathering

In order to contain or reduce the abundance of an incursion of yellow crazy ant, it is essential to first determine the limits of its distribution. The limit of the current yellow crazy ant incursion was initially determined in October 2014. The Management Plan is based on the results of these delimiting surveys. However, it is possible that the area infested by the ant may have significantly increased or decreased and delimiting surveys need to be conducted prior to commencement of each treatment round. Depending on the results of these surveys, management may need to be revised.

The Management Plan is based on treating high abundance sites only and treating an entire motu (of a size that can comfortably be treated in one day). Any larger sized motu will need a delimiting survey. Delimiting surveys do not need to be conducted on motu of

less than 10 hectares if ant abundance is uniformly high as the entire motu would be treated.

3.4 Delimiting surveys

Visual surveys are supplemented by placement of paired protein and carbohydrate lures. As ants tend to forage most when temperatures are coolest during the morning the surveys should be conducted between 8:00 and 11:00am.

There will be fewer ants farther from the main infestation, so they will be harder to detect. To avoid overlooking ants take a little longer looking - stand still for about a minute every five metres and watch for any ants during that time.

Even if ants are not seen, this can be because there are few of them. Paired sugar and protein lures are used to increase chances of detection. Place a cotton wool ball or screwed up tissue soaked in sugar water in an open screw top sample jar and place a 1cm³ blob of sausage and peanut butter mixture in another. Place a pair of lures every ten metres from the point no ants are found visually. Additionally. Leave the sugar lures for 15 to 30 minutes before returning to check them. If there are yellow crazy ants present at the lures, mark the location and count and record the number present. Continue until no ants are found using the lures. A buffer of 100 metres should be added to this point. This is called the infestation boundary.

3.5 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 (5.3.2.3.) below, but basically this involves counting the number of ants crossing a square of white card in a 30 second period.

3.6 Environmental impact measurement

In order to check for non-target impacts, any crabs, birds, lizards, fish, spiders or insects on the ground other than yellow crazy ants encountered during the visual survey will be recorded. It is not important to identify what is encountered beyond these six categories. 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 surveillance of ants

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 and high value areas (See Table 2 below), as well as community gathering places (shops, post office, community halls etc.). 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.

Table 2: A list of areas in Tuvalu which represent either potential sites of infestation and spread of yellow crazy ants or sites where the establishment of yellow crazy ant would cause significant environmental or social problems (add to these as needed for future treatments)

High Risk Areas	High Value areas
Ports and airport	Motala conservation islet
Warehouse and holding area	Fualopa conservation islet
Boat departure area	
Hotels	

4.1.2 Active surveillance of ants

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 see. Use of paired sugar (a ball of cotton wool soaked in sugar water) and protein (a 1cm³ blob of sausage/meat/fish and peanut butter mixture) lures placed every ten metres will aid in discovery of any smaller populations of yellow crazy ant.

Note the location and record the limits of any populations found.

4.2 Movement controls

If an incursion or new population is discovered, it must be prevented from spreading. There are two parts to the containment of Yellow crazy ant: restriction of natural spread and reducing the risk of jump dispersal.

Restriction of natural spread may be achieved by the placement of bait stations in high risk areas and at the periphery of the known distribution. Baiting is described in detail in section 5 Treatment and Monitoring below.

The risk of natural spread can be further reduced by buffer clearance - this involves the removal of any potential nesting sites such as piles of rubbish, compost, tree stumps etc. from the area immediately surrounding the infestation. Anything that is removed must first be thoroughly checked for ants first.

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. In Fongafale, Funafuti and Fangaua, Nukulaelae this is any activity that involves the movement of vehicles, machinery, plant material, rubbish or food from the infested area to other motu or atolls.

Yellow crazy ant was observed in the following areas (Figure 1) in October 2014. These locations should also be considered to be high risk:

- Nukulaelae atoll: Fangau (main inhabited islet), Motala and Tumiloto (picnic islet).
- Funafuti atoll: Fongafale Islet (main inhabited islet), Fualopa (conservation islet)
- Niulakita Island

Materials and things that ants can use to be transported include:

- Food and fresh produce
- Passengers and their baggage (including picnic baskets)
- Empty coconut husks or shells
- Rubbish from any of the affected areas.
- Pipes or building materials
- Old stacked timber
- Potted plants
- Soil, gravel or compost
- cuttings or garden debris
- Transport containers
- Uprooted plants

These items should be thoroughly inspected for ants before they are allowed to be removed from the high risk area.

There are two further steps to reduce the risk of jump dispersal:

- Control in high risk areas - this involves the placement of baits in high risk areas (i.e. those areas where an incursion has been identified). Protocols for treatment using baits are detailed in Section 5 below. In domestic structures where Antoff is not permitted for use, products such as Raid Bug Barrier may be used around windows, doors and other potential points of entry, and Liquid Raid can be used outdoors..
- Building awareness - poster campaigns and public talks are necessary to spread awareness of the incursion in the community. This is effectively an extension of passive surveillance (Section 4.1.1) with a focus on which items can potentially move ants.

5 Treatment and monitoring

The Treatment and Monitoring plan. Table 1 outlines the treatment plan. Depending on the results of the first Monitoring exercise, these plans may be modified.

Table 1: Approximate timetable of treatment and monitoring activities, based on treatment activities occurring in the dry season in Tuvalu. **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 April to March

April 2017	Year 1		Years 2 and 3	
	July	October 2017	May	September
Delimiting / Treatment Te Puka	<i>Monitoring</i>	<i>Monitoring</i>	<i>Monitoring</i>	<i>Monitoring</i>
	<i>Delimiting / Treatment Motala</i>	<i>Monitoring</i>	<i>Monitoring</i>	<i>Monitoring</i>

5.1 Treatment Standard Operating Procedures (SOPs)

5.1.1 Health and safety

The active ingredient being used in this treatment is Fipronil, an insect neurotoxin. The toxin is in low (0.01/Kg) concentration in a fishmeal-based attractant bait called Antoff. Because of this low concentration, no significant health effects are expected from short term exposure to this product. However, as a precaution all participants in this treatment will be issued with the following personal protective equipment (PPE):

- Nitrile gloves

In addition, all participants are encouraged to wear long sleeved shirts, closed shoes and long trousers to minimise risk of any skin contact with bait.

Key messages related to 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 Antoff bait which contains a very small dose of the insecticide Fipronil (0.01g of the active ingredient per Kilogram of bait).
- All pesticides will be kept out of reach of children and while using the baits staff will use appropriate PPE and shall not eat, drink or smoke. In the literature no ill effects on humans have been reported through use of the Fipronil.
- Potential risks to human health will be mitigated by fully communicating these risks to the community, placing restrictions (withholding periods) on food harvesting, 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, treatment may be discontinued at the discretion of the community.
- After the treatment is completed there will be an exit health survey (populated areas only). 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, SPREP or MNRL containing information regarding the correct use of Fipronil baits.
- 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 running water.

5.1.2 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 5 hours.
- To minimise 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 highest tide level on the lagoon or ocean shore)
- Gain owners consent before spreading bait around dwellings.
- Notification of treatment. All residents of Fongafale, Funafuti and Fangaua, Nukulaelae 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 MNRL officers.

Withholding periods for crop harvesting

- 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.
- These baits are highly unlikely to transfer active ingredients into plants through dermal contact with leaf surfaces. Fipronil is also immobile in soil and so is highly unlikely to be transferred into plant structures through transpiration through soil contamination.
- Notwithstanding, it is considered prudent to apply a withholding period in areas where treatments have occurred and food crops are grown as a precaution, despite it probably being an unnecessary step.
- There is no withholding period listed for any granular products containing Fipronil on crops, however there are withholding periods for liquid sprays containing Fipronil that are applied to foliage that vary from 7 days to 42 days depending on plant species.

- For this reason it is considered precautionary to use a 42 day withholding period for crops harvesting in the treated areas.

Withholding periods for animal harvesting

- Limited accumulation of toxin has been observed in muscle and fatty tissue of some crustaceans (crayfish, copepods)
- No animals should be harvested for food from the treatment area during treatment or in the period after while bait is still visible on the ground(or 3 months to be conservative).

5.1.3 Staffing requirements

Treatment will be undertaken by a team of seven - 14 people. The teams will carry out all bait application. The team will comprise:

- Up to seven people operating bait spreaders,
- one spreader support person carrying the bait
- two support people ensuring spacing of bait is even

These roles may be rotated as appropriate.

Specific roles will be allocated on the day. The teams will comprise the following personnel for Fualopa:

- 4 - 11 MNRL / Kaupule reps
- 1 SPC personnel
- 2 PB personnel

5.1.4 Ant treatment materials

5.1.4.1 Pesticide descriptions

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

NOTE. An instructional video on bait application is available for viewing at the Pacific Invasive Ant Toolkit YouTube channel:

(<https://www.youtube.com/watch?v=iLWNYHoAz3Y>) or on the USB provided by Pacific Biosecurity

5.1.4.1.1 Antoff® bait

Antoff® bait will be the main bait used for the control of Yellow crazy ants. The active ingredient in the bait, Fipronil, is a slow acting poison that works on the ants' neuro-system. The bait is in granular in form (Figure 2a and 2b) and will be distributed at a base rate of 10 kg per hectare using manual spreaders. In areas of high infestation an additional application may be required.

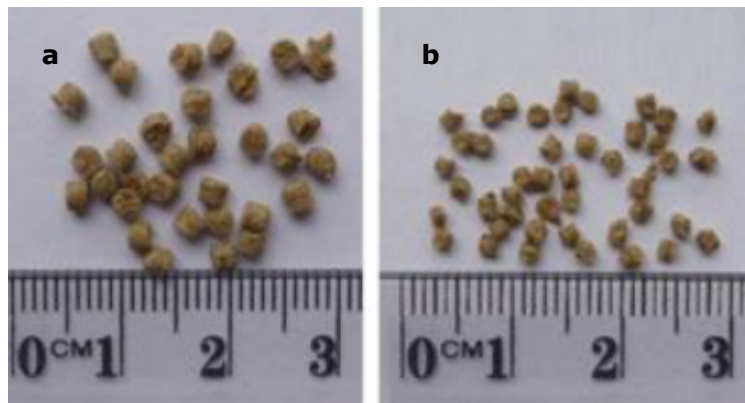


Figure 2: (a) Antoff bait granules standard size and (b), smaller size

Antoff® bait application

5.1.4.1.2 Hand held spreaders

These will be supplied by Pacific Biosecurity. The spreaders feature a hopper for holding the bait, a winding handle that agitates the bait and scatters it over the ground, and an adjustable opening that is used to control the amount of bait that is spread.

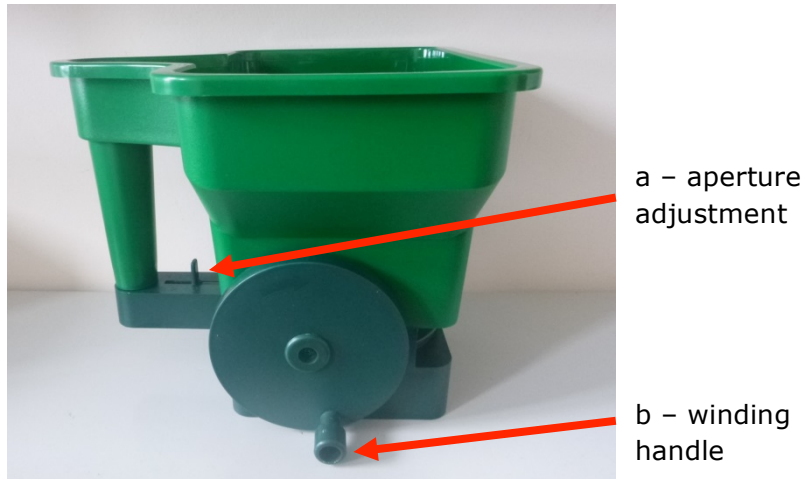


Figure 3: Hand held bait spreader of the type to be used, showing the winding handle (a), the aperture adjustment (b) and correct grip. The aperture should be set at “3”, but may require adjustment to ensure appropriate flow of bait for the terrain and speed of distribution.

With the aperture set at “3” (see Figure 3), the operator winds the spreader handle while walking at a normal pace. The swath width will be approximately 2.5 metres. Application is undertaken by each operator walking in a straight line from one end of the infested area to the other 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.

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 (at least 10 metres inland from the vegetation edge is preferred)
- No bait is spread within 5 metres of a residential building without consent of the owner
- No bait is spread where domestic animals roam

Rainfall within 5 hours of treatment will reduce effectiveness so plan to conduct treatment when rain is not expected for 5 hours.

If the area to be treated is particularly densely vegetated, clearing some tracks a few days before can be useful – particularly to delimit the boundaries of treatment tracks.

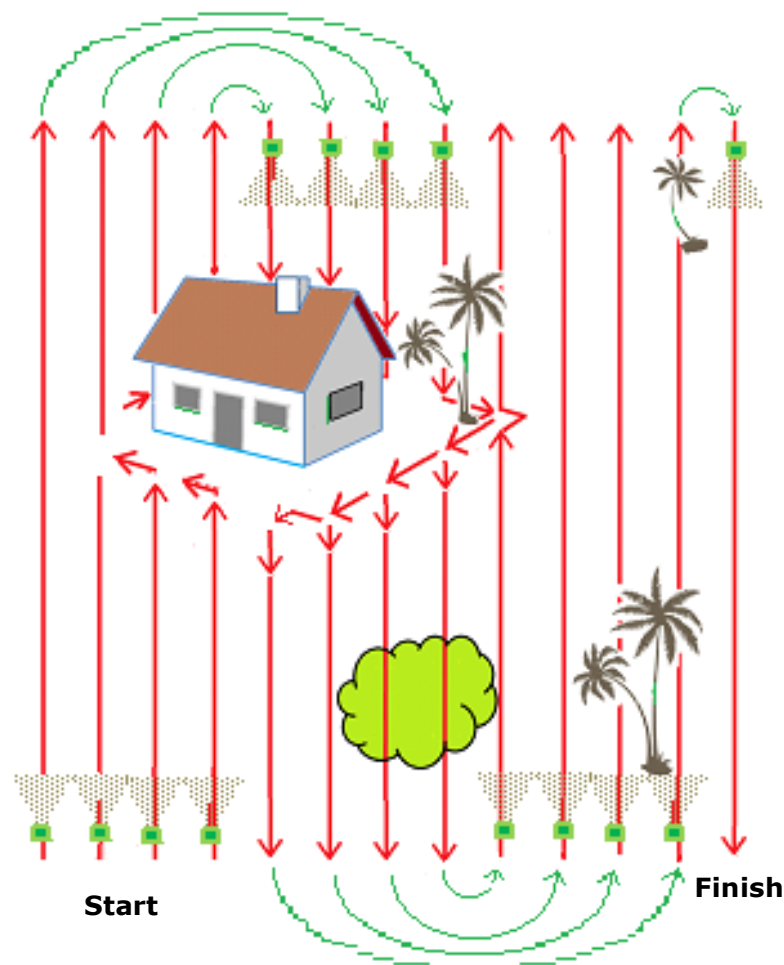


Figure 5: Example of a treatment path taken by four operators treating around an urban structure. The operators are spaced approximately 2.25m apart, and move as a group from one end of the treatment area to the other. The 2.5m swaths of bait overlap ensuring that the entire area is covered. The swath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

5.1.4.1.3 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 equates to approximately 500g of Antoff bait, 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.

5.2 Supplementary or alternative treatment options

Although not within the scope of the current management activity, it is worth being aware of some of the alternative treatment options available for management of yellow crazy ant.

5.2.1.1.1 Vanquish Pro paste

This paste is particularly useful in areas where it is not appropriate to spread granular bait on the ground, such as around pigsties and in other areas where roaming stock may come into contact with it

Vanquish Pro/ Xstinguish is a green Fipronil based bait (Figure 6a) that is applied as a paste from a sealed syringe-like cartridge. The product is available Flybusters antiantis (<http://www.flybusters.co.nz/>) in two sizes from– a 100gm syringe (Figure 6b) and a 325gm cartridge that is applied using a caulking gun (Figure 6c). 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. The paste is prone to drying out, wherever possible apply it in a sheltered spot out of direct sunlight. Application of the paste should be spaced at approximately 2 metre intervals, where ants forage. Once the vacuum bag has been opened the bait has only a short shelf life – refrigeration will help to some degree.

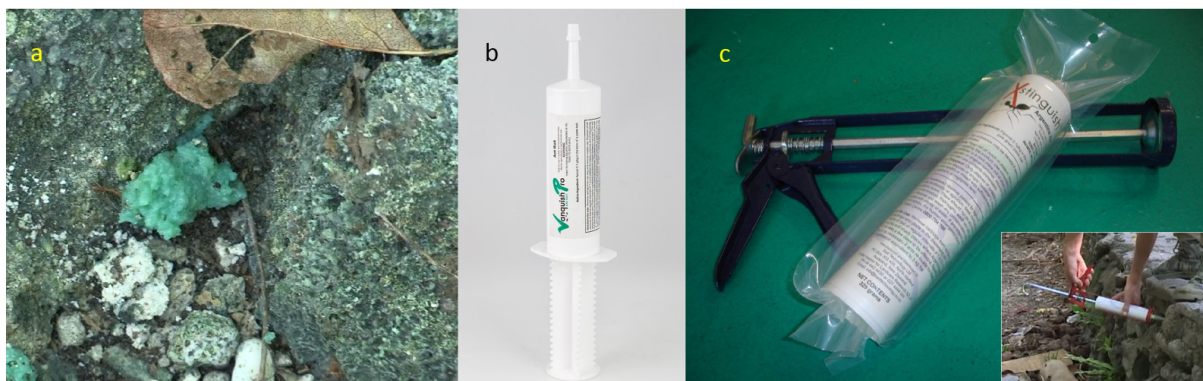
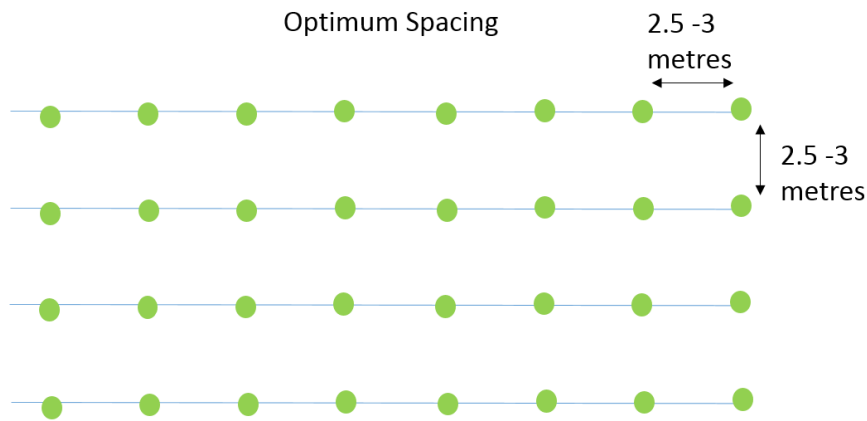


Figure 6: a) Vanquish Pro is a green Fipronil based bait paste that is applied in shaded areas and crevices, b) the product is available in ready to use 100g syringes or c) 325g cylinders that require a caulking gun and nozzle (note Figure 1 c depicts a tube of Xstinguish a sister product to Vanquish Pro that has a slightly different bait formulation but identical toxicant content).

The application rate of Vanquish Pro is 3kg/hectare so a 325g cartridge is enough to treat 1100m². However, for yellow crazy ant treatment it is used only where broadcast bait is not viable, such as areas where livestock, domestic animals or children may eat or tamper with granular bait. When used as a supplement to broadcast baiting distribute the bait at approximately 2.5 metre intervals within the designated treatment area.



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.

5.2.1.1.2 ATTRATHOR targeted insecticide

For the control of invasive ants, ATTRATHOR is used in sheltered areas and building interiors where broadcast bait is not appropriate. ATTRATHOR comprises two parts: an attractant and a toxicant (Fipronil). The insecticide comes in a concentrated form and is diluted in water at rate of 10ml of ATTRATHOR to 1 litre of water. Once applied to a surface, the water rapidly evaporates leaving an invisible residue. The attractant in the residues draws the ants to the area, where they become covered in the poison and then carry it back to their nest. ATTRATHOR is particularly effective when sprayed directly onto a trail of foraging workers as it does not interfere with the trailing pheromones and it is guaranteed that a high volume of ants will pass through the poison and carry it back to the nest.

Mixing ATTRATHOR

Always wear nitrile gloves when handling ATTRATHOR

To begin fill a garden spray bottle (Figure 7 right) with HALF the required amount of water. Typically, ATTRATHOR is mixed in 1 litre batches, so fill the garden spray bottle with 500ml of water.

The ATTRATHOR concentrate bottle has a measuring dispenser built into it. Shake the bottle gently before use. Hold the bottle upright, remove the pouring cap (Figure 7 left) and squeeze the centre of bottle gently. The measuring dispenser will gradually fill. When the required amount has been dispensed (e.g. 10 ml for a 1 litre mix) pour it into the garden spray bottle. Then add the remaining half of water (another 500ml). Replace the lid on the ATTRATHOR concentrate immediately, then replace the lid of the garden spray bottle and shake gently. The spray bottle should have a pump handle to pressurise it. Pump the bottle until the handle become hard to move.



Figure 7: The ATTRATHOR concentrate bottle (left) has a built in measuring dispenser. Remove the pouring cap and gently squeeze the bottle to fill the dispenser to the desired volume. The spray bottle (right) should have a measure on the side. Fill the bottle to half the desired volume of water, add the ATTRATHOR concentrate then add the other half of water. Replace the lid and shake gently before application.

Application of ATTRATHOR

Always wear nitrile gloves when applying ATTRATHOR. Avoid breathing the spray mist.

Spray one 15cm line of spray approximately every 2.5-3 metres. If the ATTRATHOR is being sprayed in areas where young children or domestic animals might come into contact with it make sure it is sprayed on surfaces over 1.5m from ground level. Apply ATTRATHOR in sheltered areas or interiors where broadcast bait is not practical. Do not spray ATTRATHOR in areas exposed to rain. Where possible spray directly on to trails of target ant species.

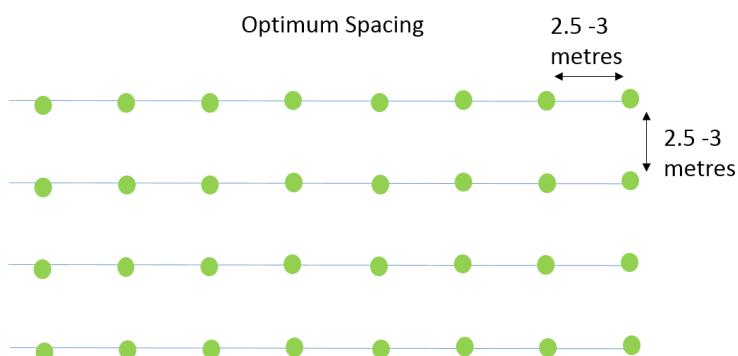


Figure 8: Optimum spacing grid for application of ATTRATHOR Targeted insecticide. One 15cm stripe of spray should be placed greater than 1.5 metres above ground level in sheltered areas or interiors where possible. Where trails of target ant species are visible, it is advised that ATTRATHOR is sprayed directly onto the trail.

5.3 Monitoring plan

Monitoring is used to measure the success of treatment and identify any non-target effects.

5.3.1 Social monitoring

5.3.1.1 Health surveys

After the completion of treatment a two page health survey (Appendix 6) will be undertaken with all participants and stakeholders in the treatment area. 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.

5.3.2 Environmental Monitoring protocols

The monitoring protocols below have been adapted from the Northeast Arnhem Land Yellow Crazy Ant Eradication protocols. Control success can be assessed in three complementary ways:

1. Visual survey. A visual inspection will assess microsites (e.g. tree base, rock, and infrastructure) throughout an area, with each inspection spaced no further than 10 m apart. Each inspection should last for at least 5 seconds per microsite.
2. Attractive baits. Attractive bait will consist of a cotton ball or screwed up tissue soaked in sugar water. The bait is left for at least 15 minutes, and then inspected for the presence of ants.
3. Card counts. Card counts allow a quick assessment of ant density.

5.3.2.1 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
- Pay particular attention to noni and other flowering plants in the area as they are likely to have ants on them.
- Ants are usually highly abundant within the centre of the infestation, and abundance declines towards the edges (i.e. the 'invasion front').
- It is important to record the edge of the invaded area. Use pink flagging tape to help define the boundaries of the infestation.
- Ants may be present but difficult to detect because abundance declines around the invasion front.
- To enhance detection, stop and observe for a minute or so until an ant is seen. Continue another 5 metres and look around until an ant is seen. Continue doing this until ants are no longer found and mark this with the pink flagging tape as the likely edge of the invasion.

5.3.2.1.1 Monitoring non-target effects

During the visual survey record any crabs, spiders or insects other than yellow crazy ants encountered on the ground in the tally sheet used during the Delimiting and Baseline data Gathering section. See Appendix 2 for the sheet. In addition, record any dead birds, lizards or fish observed and their location.

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

5.3.2.2 Attractive lures

Because visual surveys may overlook ants at very low abundances, attractive lures will be used up to 100 metres beyond the last observation of YCA recorded during the visual survey.

A 20% sugar solution is prepared using granulated sugar and water. Two to four squares of toilet paper are then rolled into a ball and soaked in the sugar solution to make the lure and placed in a sample pot with the lid removed. In addition of 1cm³ blob of sausage and peanut butter mixture is placed in a sample pot. These lures are then placed in pairs on the ground at approximately 10 metre intervals moving away from the delimited edge of the infestation up to a distance of 100 metres. The lures are left on the ground for 15-30 minutes.

Once 15-30 minutes have passed, the lures are revisited and checked for YCA. If YCA are observed their presence is recorded as the new edge of the infestation and further lures are placed up to 100 metres from the point of observation until no further ants are detected.

5.3.2.3 Card counts

This assesses the density of yellow crazy ants using a count of the number of ants crossing a card in a 30 second period. Four monitoring sites should be randomly chosen per hectare. At each monitoring site measure *A. gracilipes* activity at 11 stations spaced at 5 m intervals along three replicate 50 m transects spaced 10 m apart (Figure 9a). Counts at all stations within each transect are summed, and the mean value of the three replicate transects is used as an index of relative abundance between sites. This method has only been used for yellow crazy ant, but may be applicable to other ants. Alternative means of assessing abundance require more technical knowledge, effort and time.

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 9b). The paper is cut into 4 squares (i.e. 4 card count cards can be made from a sheet of A4 paper)
2. Choose a starting station (e.g. Figure 9a transect 1, station A)
3. Clear a space on the ground large enough for the card and place the card on the ground.
4. For 30 seconds count the number of ants that cross the chosen quadrant. Record this number.
5. Move 5 metres (about 6 paces) to the next station (i.e. Figure 9a transect 1 station B). Repeat steps 3-4.
6. Repeat steps 3-5 a total of 11 times so that 11 numbers are recorded (i.e. one for each station in this transect).
7. Move 10 metres (about 12 paces) across to start transect 2, point a.
8. Repeat steps 3-6 to complete transect 2.
9. Repeat steps 7 and 8 to complete transect 3.
10. 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.

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 less than one person alone.

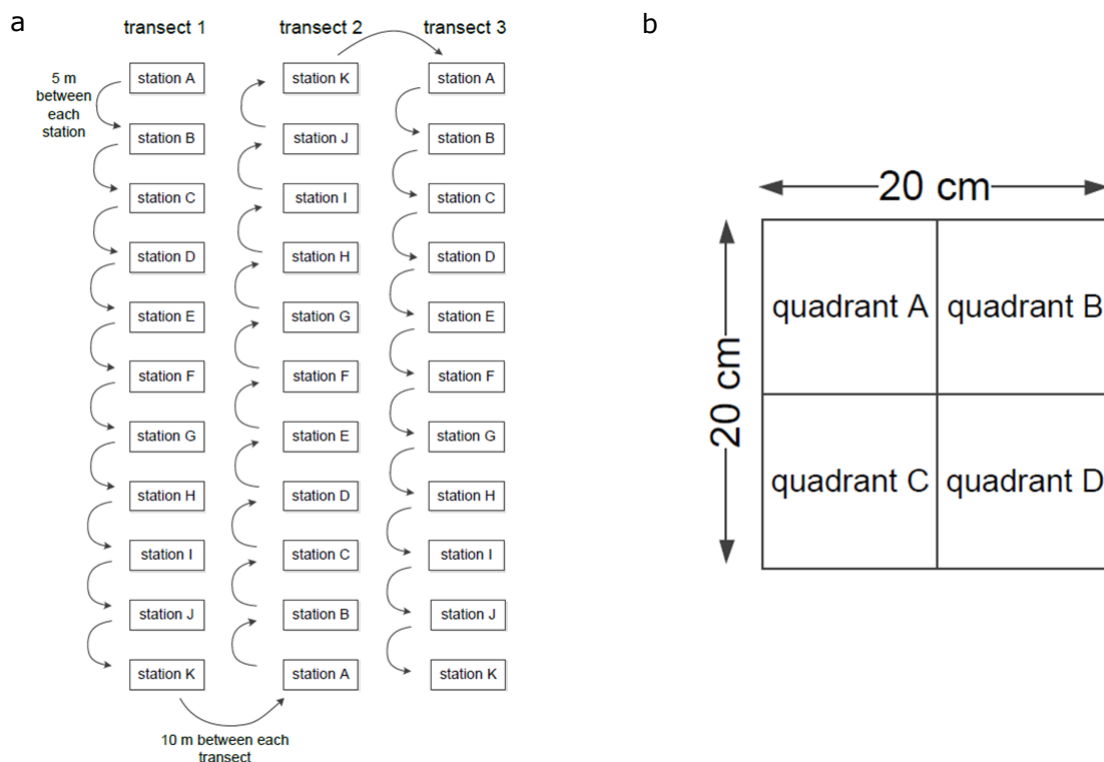


Figure 9: (a) Sampling layout for card counts of yellow crazy ant activity. (b) card used for card counts (cut from A4 sheet).

5.4 Evaluation

5.4.1 Evaluate effectiveness of treatment

The target of this management plan is to significantly reduce the numbers of YCA infesting Fualopa islet (covering approximately 2ha) and Motala islet (covering approximately 7ha) with a single treatment of Antoff granular bait.

Potential non-target effects of baits on native wildlife and domestic animals such as cats, and chickens are always of concern and must also be monitored for

Evaluation of the success of management. This section incorporates elements from the SPC General Emergency Response Plan for Invasive Ant Incursions (2008).

The targets for yellow crazy ant management in Tuvalu are:

1. Yellow crazy ant infestation on Fualopa and Motala significantly reduced in abundance after a single treatment with Antoff (card counts of zero or at least less than 35 – assuming card counts prior to treatment > 35).
2. Monitoring in Years 2 – 3 finds no significant increase in yellow crazy ant abundance on either Motala or Fualopa.

5.4.2 Evaluation of non-target effects of bait, particularly native wildlife

Mortality of non-target species is incorporated in the Monitoring protocols (5.2.2). If high levels of mortality are observed, comparison will be made between similar treated and untreated sites. If marked differences are found to be significant, discussions will be opened with MNRL about review of the management plan.

5.4.3 Review management plan

Based on the results of the evaluation above the management plan will be reviewed. It is possible, for example, that treatment will need to be repeated. All decisions made need to be communicated to all stakeholders prior to implementation of the revised plan.

6 Acknowledgements

The Management Plan refers to the following documents:

- 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 Tuvalu)
- 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
- SPC General Emergency Response Plan for Invasive Ant Incursions 2008

- Vanderwoude, C. 2013. Considerations for eradication, containment and longterm monitoring of little fire ants in Tahiti - Report to the Secretariat of the Pacific Regional Environment Programme
- Vaqalo, M., Lonolona, M., Panapa, S and Khan F. 2014. Yellow crazy and fruit fly in Tuvalu – Report prepared for SPC
- Ward D.F. and Toft, R. 2011. Argentine ants in New Zealand.
<http://argentineants.landcareresearch.co.nz/> (accessed 05/03/2015).
- Xstinguish Argentine Ant Bait MSDS



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Supported by the New Zealand Aid Programme. The views expressed in this publication do not necessarily reflect those of the New Zealand Government.


7 Appendices

7.1 Appendix 1. Warning poster for Antoff treatment

POISON FIPRONIL ANT CONTROL

FROM 19/04/2017 – 20/04/2017






DO NOT TOUCH BAIT


**WATCH CHILDREN
AT ALL TIMES**

**DO NOT EAT ANIMALS
FROM THIS AREA**

For more
information
contact:



Bait



7.2 Appendix 2. Tally sheet for visual monitoring

This table should be used to record crabs, spiders and insects other than ants encountered on the ground during Visual Delimiting Surveys and Monitoring. It is not important to identify animals observed beyond these three classifications. 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 YCA)	
Alive	Dead	Alive	Dead	Alive	Dead
Lizard		Bird		Fish	
Alive	Dead	Alive	Dead	Alive	Dead
After Treatment					
Crab		Spider		Insect (other YCA)	
Alive	Dead	Alive	Dead	Alive	Dead
Lizard		Bird		Fish	
Alive	Dead	Alive	Dead	Alive	Dead

7.3 Appendix 3. Awareness poster / movement control for yellow crazy ants

YELLOW CRAZY ANT STOP THIS INVADER

IN THE PACIFIC

These ants **will cause harm** to you, your crops and your environment. If you find any of these ants, contact your local biosecurity/quarantine







Anoplolepis gracillipes
Size: 5mm


sprays acid


harms crops


harms people


harms wildlife


lives in trees


lives on ground


night active


day active

What they look like

- movement is fast and erratic - "crazy"
- long legs and antennae
- yellowish brown body
- workers 3-5 mm long
- queens are much larger and bulkier than workers

Problems they cause

- kill small animals like crabs, birds & lizards
- sprays acid, annoys people at home and work
- farms other insects that damage crops and trees

Where they live

build nests in and under places like

- cracks in buildings
- leaves, rocks and wood
- rubbish piles
- crab burrows
- machinery
- roots of trees
- decaying coconuts
- firewood piles

How they travel

hidden in

- fruit and other food
- building containers
- plants and soil
- rubbish
- firewood
- machinery
- vehicles

Yellow crazy ant RESTRICTED AREA



Movement controls are in place in the area below to stop the spread of yellow crazy ant



The [yellow crazy ant can cause significant harm to the people, economy and environment of Tuvalu.

Moving ANY of the following out of the restricted area without a permit is prohibited by law.

- vehicles
- items that have been in contact with the ground like trailers, boats, machinery
- potted plants
- animal food like pig slops, hay
- soil, dirt, sand, mulch, compost, manure
- plant material - including fruit, vegetables, coconuts and plant cuttings
- building materials like wood, sand, gravel, cement, pipes
- Rubbish and other waste

Failure to comply may result in fines up to \$[XXXX.XX]

Permits are issued by [name and contact details of agency]

If you see or think you have seen yellow crazy ant or need more information contact: [contact details]



7.4 Appendix 4. Material Safety Data Sheets (MSDS) for the pesticides mentioned in this management plan

Material Safety Data Sheet: **ANTOFF® Fipronil Ant Bait**
Date of Issue: 2nd September 2014

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, 8:00am – 5:00pm)
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.
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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

Acute: 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 LD₅₀ value in rats of 97mg/kg and a dermal LD₅₀ value of >2000mg/kg. Human toxicity data is not available. To absorb an LD₅₀ dose for a 200g rat the rat would need to eat approximately 194g of bait.

Chronic: 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.

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 unclassified. (Technical grade fipronil is S5)

16. OTHER INFORMATION

Date of Preparation of this MSDS: 2nd September 2014

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 – Pestacides 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

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 AUD1). 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.

SAFETY DATA SHEET

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Phone: 13 35 36 (ALL HOURS)

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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.

SAFETY DATA SHEET

Issued by: Ensystem Australasia Pty Ltd

Phone: 13 35 36 (ALL HOURS)

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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: Ensyslex 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

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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: Ensysstex 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.

Bait Technology Ltd and its agents give no guarantee or warranty of any kind expressed or implied concerning the use of this product and will not accept any responsibility whatsoever whether in contract or tort for any loss including consequential loss arising out of the use of this product or caused by this product.



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
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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. 1200068-37-3

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

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.

Bait Technology Ltd and its agents give no guarantee or warranty of any kind expressed or implied concerning the use of this product and will not accept any responsibility whatsoever whether in contract or tort for any loss including consequential loss arising out of the use of this product or caused by this product.

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 ant, 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 10). 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:gylcol 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 decompose.

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 ant and other ant species as well the state of other invertebrate communities.

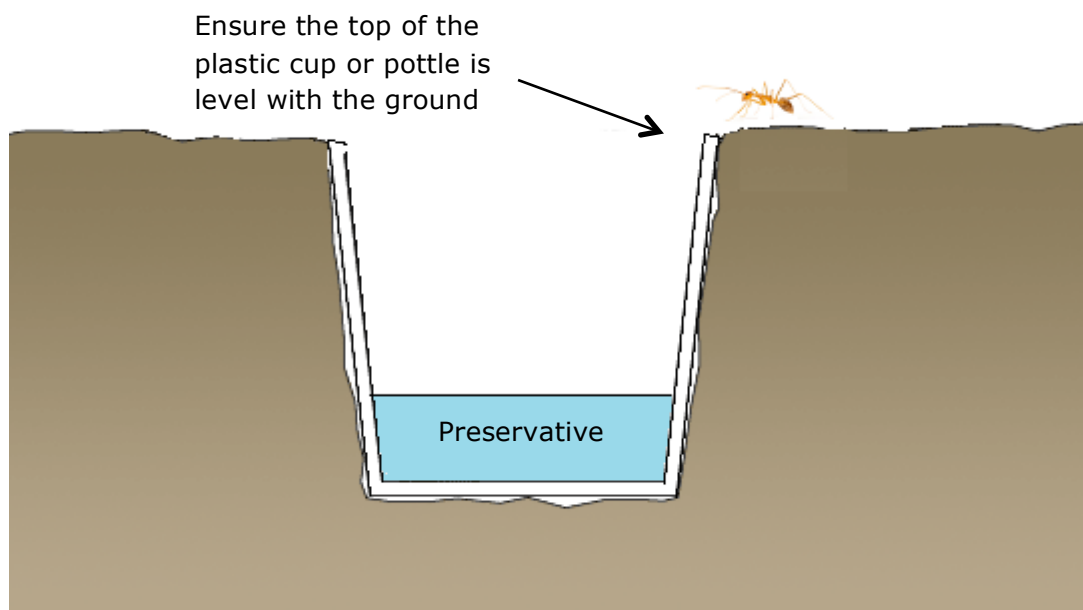


Figure 10: A cross section through an embedded pitfall trap.

7.5.2 Attractive vials (pottles)

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

Typically, a food-based lure 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.

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 11: 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 morpho-species	Comments:	
Worms			
Crabs			
Spiders			
Beetles			
Ants			
Moths & Butterflies			
Crickets			
Bugs			
Thrips			

7.6 Appendix 6. Health Survey

Please modify this for use as needed.

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 MNRL 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 MNRL for the interviewee. If there are any questions, concerns or further information required at any time, please contact MNRL officers or Pacific Biosecurity:

Monica Gruber
Pacific Biosecurity, Victoria Link Limited, Victoria University of Wellington
PO Box 600, Wellington 6140
New Zealand
ph: +64 4 463 5026
email: monica.gruber@vuw.ac.nz

Have you been unwell **before** MONTH/ DAY/ YEAR

- Yes
- No

If Yes, please give details of your symptoms

Have you experienced any of the following symptoms **before** MONTH/ DAY/ YEAR

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

Have you been unwell **after** MONTH/ DAY/ YEAR

- Yes
- No

If Yes, please give details of your symptoms

Have you experienced any of the following symptoms **after** MONTH/ DAY/ YEAR

- 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 MONTH/ YEAR?

- 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

Outcomes of treatment and monitoring should be recorded for any yellow crazy ant management activity in Tuvalu.

7.7.1 April 2017 (Te Puka)

Date	Activity	Results	Outcomes
Tues 18 Apr 2017	Maclean Vaqalo SPC and Monica Gruber and Evan Brenton-Rule from Pacific Biosecurity (PB) arrival in Funafuti. Briefings with stakeholders.	The PB / SPC team met with Matio Lonolona from MNRL Agriculture and discussed the plan for the week. The PB / SPC / Agriculture team met with the Director of Agriculture (Sam Panapa) to brief on activity, and the MNRL Permanent Secretary MNRL (Niko ?) and the Kaupule Secretary to brief on activities.	Stakeholders indicated support of the Activity. The PS noted that if we were to treat Te Puka islet the community would need to be informed. The Kaupule Secretary expressed interest in having Te Puka treated as the community were concerned about the number of ants on the islet.
Weds 19 Apr 2017	Pre-treatment monitoring using card count transects on Fualopa (1) and Te Puka (3). The team included PB / SPC staff together with Agriculture quarantine and extension staff and Kaupule representatives.	Card counts on Fualopa (one set of transects) were 24.5 (less than the 'magic number' for treatment of 37). Matio thought the abundance on Fualopa had declined. Monica outlined the population declines often observed in yellow crazy ant populations, and suggested perhaps the Fualopa population was past its peak abundance. Te Puka card counts (three sets of transects) were >420. Environmental impacts of treatment and the goals of treatment were discussed with an emphasis on minimising non-target effects. The team agreed that Fualopa should not be treated but that we should recommend to the Kaupule a single treatment on TePuka. On Te Puka we did baseline environmental surveys and looked for queen pupae (treatment should not be undertaken if queen pupae are found).	On return we briefed the Kaupule Secretary and outlined our recommendation to treat Te Puka once only. We advised of environmental impact risk and why we would strongly suggest with only one treatment. The Secretary confirmed that the community would like us to undertake treatment. The Kaupule would issue radio announcements on Thursday advising that we would be doing treatment on Friday and that Te Puka would be designated a no-access motu for 3 months. If anyone had questions they were asked to contact the team at Filamona Lodge.

Date	Activity	Results	Outcomes
Thu 20 Apr 2017	Introduction to the Pacific Invasive Ant Toolkit and workshop focussing on Assessing the Problem, Getting rid of ants, and Monitoring sections.	11 attendees (all except * attended the entire workshop): Moe Saitala (Acting Director Environment) , Sam Panapa (Director Agriculture) , Matio Lonolona (quarantine officer) , Uatea Vave (extension officer) , Maleko Mamatu (extension officer) , Faavae Lutelu (extension officer) , Falatea Vatea (Lotasi)* (Kaupule rep) , Kaunatu Kilisi (Kaupule rep) , Ropati ? (extension officer) , Tene ? * (extension officer) , Evan Brenton-Rule (PB) , Maclean Vaqalo (SPC) .	The full range of options for yellow crazy ant treatment were covered (including non-toxic options). Again, the environmental impacts of treatment and the goals of treatment were discussed with an emphasis on minimising non-target effects. Buckets containing treatment product and any contaminated equipment (e.g. used nitrile gloves) should be shipped back to New Zealand.
Thu 20 Apr 2017	PB/SPC team met with Garry Preston and Uschi ?, Fisheries advisors under contract to MFAT.	Garry and Uschi indicated their concerns about the long-term effects of the treatment product, particularly in the marine environment. Monica outlined the known effects (final long term environmental fate is not known), the mitigation procedures used (including a single use), and that the product was approved by the Australian government for use in sensitive environments (Christmas Island, Northern Territory, Queensland).	Monica promised Garry and Uschi's concerns would be passed on to the Kaupule and Agriculture teams, and suggested it would be useful for the advisors to continue a dialogue with their counterparts in Agriculture and Environment. We all agreed to keep in touch and look in to ways of testing for long term effects of fipronil (we discussed some options).
Fri 21 Apr 2017	Treatment of Te Puka motu	The 14 member team (SPC / PB / Agriculture / Environment and Kaupule reps) left for Te Puka around 0715. After being advised of Garry and Uschi's concerns, Matio decided that a larger buffer zone should be allowed for (omitting 20-30 metres inside the vegetated area of the motu). We started treatment according to the standard protocol around 0830. The boatmen assisted by clearing heavily vegetated areas. However it was clear this would be very slow so it was decided we would just have to work around these areas. Monica suggested that backpack blowers would be a good solution to the dense vegetation as the blowers can spread bait much further. The entire motu was treated by 1500. A squall arrived at	The team worked really well together under Matio's leadership. Matio's decision to increase the buffer zone was a wise one, especially given the rain shower. Typically treatment should not be undertaken within 5 hours of rain. However the skies were clear at the start of day and the squall arrived quickly. In hindsight, we should have kept a closer eye on the skies. The treatment early in the day was in the more highly infested area, and this was within the 5 hour window, fortunately. The area most likely to be affected by the shower was in the north, where the ants appeared to be at much lower density. Monica said she would look at the cost of shipping a blower or blowers to Tuvalu, and if this could be incorporated in the budget. We

Date	Activity	Results	Outcomes
		around 1515 with a heavy shower lasting until 1530. After returning to Fogafale, we reported back to the Kaupule Secretary.	reported back to the Kaupule Secretary, and brought his attention to the concerns raised by Garry and Uschi, and strongly advised a single treatment only.
Sat 22 Apr 2017	Awareness briefing at the Agriculture Market.	A market is held in Fogafale by the Agriculture department on Saturday mornings. This was used as an opportunity to brief residents about the treatment on Te Puka and the 'no access' ban for the following three months.	Monica and Matio briefed the villagers on the treatment. People were advised if they had any questions they could meet with the team at Filamona Lodge.
Sun 23 Apr 2017	Rest day.		
Mon 24 Apr 2017	Post-treatment monitoring.	A team of 10 (PB / SPC / Agriculture / Kaupule reps) left Fogafale at 8 to undertake post-treatment monitoring (card counts on the same transects and environmental impact follow up). Card counts had declined to an average of 16 over the three sets of three transects, an over 25-fold decline (i.e. a reduction of over 96%). No short-term non-target effects were evident (Section 7.8.1). In the evening the whole team (MNRL Agriculture staff, Kaupule reps, SPC and PB) enjoyed a celebratory dinner hosted by Agriculture, and honoured by the attendance of the Minister.	No further treatment is advised. The scale insects in the larger trees at the landing site and elsewhere should be treated with non-toxic oil, water and detergent spray by MNRL, as these insects provide an abundant food resource for the remaining yellow crazy ant. MNRL should conduct further monitoring in July and report the results to the stakeholders and Pacific Biosecurity so the funder can be kept informed regarding progress. At the evening dinner the Minister outlined how the yellow crazy ants were affecting life on Nui atoll, and stressed that this should be the most urgent next treatment site.
Tue 25 Apr	De-brief and departure.	We arranged for shipping of used buckets and nitrile gloves back to NZ via DHL, and met with the Kaupule Secretary and Director Agriculture Sam Panapa. The Kaupule Secretary was very pleased to hear of the reduction of 96% in ant abundance. Discussions with the Director Agriculture centred around support for the work on Nui.	The Kaupule Secretary supported the no access status of Te Puka, followed by further monitoring by Agriculture staff supported by the Kaupule. Monica advised that as long as the budget was sufficient, the project could support at least some of the work on Nui. It was agreed that PB would arrange to have 20 tubes of Vanquish sent to Funafuti, and would look into the cost of sending blowers for Antoff.

7.7.2 July 2017 (Te Puka)

Date	Activity	Results	Outcomes

7.8 Appendix 8. Monitoring results

7.8.1 Pre- and post-treatment monitoring April 2017 (Te Puka 9 observers)

Before Treatment		21/04/2017			
Crab		Spider		Insect (other than YCA)	
Alive	Dead	Alive	Dead	Alive	Dead
	1=1	5+5+7+6+2+3=28		12+1+10+15=38	1+1=2
Lizard		Bird		Fish	
Alive	Dead	Alive	Dead	Alive	Dead
1+4=5	1+2=3	5=5			
After Treatment		24/04/2017			
Crab		Spider		Insect (other than YCA)	
Alive	Dead	Alive	Dead	Alive	Dead
1+2+3+10+3=19		8+20+12+7+5+12=64		20+43+15+27=105	
Lizard		Bird		Fish	
Alive	Dead	Alive	Dead	Alive	Dead
1+1=2		2+1=3			
Difference					
+19	-1	+36	-	+67	-2
+14	-3	-2	-	-	-

Conclusion:

No short-term non-target effects were evident. Monitoring should be repeated in July 2017.

7.8.2 Health Survey results

Survey completed MONTH/ DAY/ YEAR

	No	Yes	Symptoms Experienced	Duration of Symptoms	Details
Felt unwell before MONTH/ DAY/ YEAR					
Experienced symptoms associated with Fipronil poisoning before MONTH/ DAY/ YEAR					
Has been unwell since MONTH/ DAY/ YEAR					
Experienced symptoms associated with Fipronil poisoning after MONTH/ DAY/ YEAR					
Has existing medical condition					
	No	Yes	Time of Contact/Consumption	Duration of Contact/Quantity consumed	Details
Touched Antoff bait while working with it					
Was PPE Worn					
Subject ate bait					
Subject ate animals from Treatment area					

Conclusion: