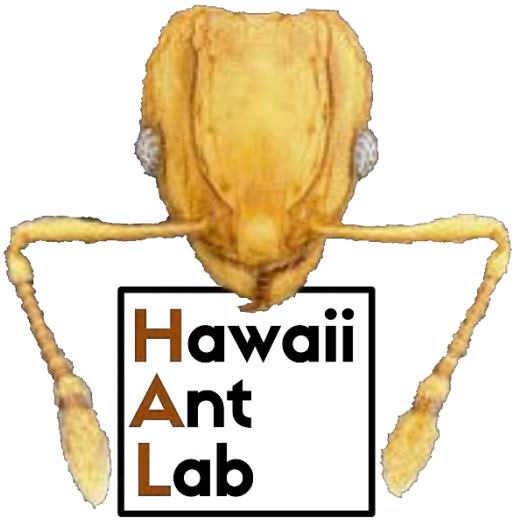

www.littlefireants.com

MANAGEMENT OF PEST ANTS IN NURSERIES

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BACKGROUND

Quarantine requirements for exporters of potted plants, flowers and foliage have become more and more stringent. It is easy to understand that moving plant pests from one location to another is detrimental to the nursery industry but what about pests we have not previously thought of as plant pests? Many insects can hitch a ride with a potted plant, and while they may not harm the plant itself, introducing these pests to new locations can potentially cause other impacts.

Ants are one of these pests. They often do not harm the plants they live in, but some species can cause huge economic and ecological damage when they are introduced to new locations. One such species, the Red Imported Fire Ant (*Solenopsis invicta*) is such a threat that the USDA has specific quarantine requirements for producers moving plants from within the RIFA quarantine zone to locations outside this zone. These requirements include mandatory treatment of stock and potting medium.

Fortunately, Hawai`i does not have Red Imported Fire Ants. However, there are several other ant species present in Hawai`i that are subject to restrictions for movement of stock between islands and interstate.

This manual is a guide to current best-practice nursery management options that minimize the impacts of these ant species to export operations.

HAWAI`I ANT LAB

**The Hawai`i Ant Lab** is part of the Pacific Cooperative Studies Unit of the University of Hawai`i. Their charter is to prevent the entry of invasive ant species into Hawai`i, develop technologies to manage those ant species already present and work to eradicate them where feasible. The Hawai`i Ant Lab is the lead group in this project, working with island Invasive Species Committees, UH College of Tropical Agriculture and Human Resources, and Hawai`i Department of Agriculture.

PARTICIPATING AGENCIES

Two key industry groups have participated in the development of this manual. The Big Island Association of Nurserymen and the Hawai`i Export Nursery Association have both endorsed and supported the project.

BIOSECURITY IMPACTS OF PEST ANTS

Shipments of potted plants, foliage, or flowers that are infested with ants are subject to certain quarantine requirements depending on where they are being transported. As a producer, this could affect your business through seized shipments, liability issues, penalties and monetary losses.

REGULATORY REQUIREMENTS

Intra-island (local sale)
Most pest ants are not "regulated species" and therefore there are no regulatory restrictions on the local sale of plants infested with ants. There is one exception to this – Little Fire Ants (*Wasmannia auropunctata*). This is a regulated species under Hawai`i Revised Statutes (HRS150A) and Hawai`i Administrative Rules (HAR chapter 4-72). Knowingly moving material infested with LFA is an offense under these laws.

Inter-island sale
The movement of potted plants, foliage, flowers and propagative material from one island to another within the State of Hawai`i is regulated by the Hawai`i Department of Agriculture Plant Quarantine Branch. All shipments must either be inspected by an HDOA inspector, or shipped from a nursery certified by the HDOA. In addition to other quarantine pests, inspectors will check for Little Fire Ants. Infested material cannot be shipped until it has undergone quarantine treatment. The shipment may be re-inspected at the destination island by HDOA inspectors located there.

Continental USA
The provisions relating to inter-island shipments apply, and additionally, State laws or regulations in the receiving state also apply. In most cases, agriculture or quarantine staff in the receiving State inspect incoming shipments also. At this point, detection of any pest ants may trigger a seizure, destruction of the shipment, or return to the origin port.

Hawai`i Revised Statutes and Hawai`i Administrative Rules can be accessed online through the State's legislative portal:

https://portal.ehawaii.gov/government/hawaii-legislature/

EXPORT CERTIFICATION

Producers can opt for HDOA nursery certification. This allows growers to export without inspections of individual shipments, and is based on phytosanitary inspections of the benches and/or growing area of stock bound for export. HDOA Plant Quarantine officers will conduct at least two inspections every year to determine whether the export section of the nursery meets required standards. For more information about nursery certification, contact your local HDOA office or go to https://hdoa.hawaii.gov/pi/pq/export-program/.

PESTICIDE USE

The use of pesticides in Hawai`i is governed by Federal and State pesticide laws. Two Federal laws have been established by the US Environmental Protection Agency to govern pesticide use in the United States. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) outlines federal governs the registration, distribution, sale, and use of pesticides. The Agricultural Worker Protection Standard (WPS) outlines worker obligations and rights with the aim of reducing poisoning and injury from pesticide handling and use. The Hawai`i Revised Statutes Chapter 149A and Hawai`i Administrative Rules §4 Chapter 66 are the State's equivalent to the FIFRA and may impose additional restrictions to the registration, distribution, sale, and use of pesticides in Hawai`i.

Under Federal and State laws, nurseries may control pest ants on nursery properties. However, many nurseries also provide landscaping services. In this case, additional State laws established by the Department of Commerce and Consumer Affairs also apply and must be adhered to. Under the HAR §16 Chapter 94, a landscaping company may NOT provide pest control services for any pest that is known to enter structures without a Pest Control Operators license. This includes pest ants. Keep in mind that all Federal and State laws must be strictly adhered to.

Links to specific laws

FIFRA:
https://www.epa.gov/enforcement/federal-insecticide-fungicide-and-rodenticide-act-fifra-and-federal-facilities

WPS:
https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps

HRS 149A:
https://www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0149A/HRS_0149A-.htm

HRS 150A
https://www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0150A/HRS_0150A-

HAR §4 Ch. 66:
https://hdoa.hawaii.gov/wp-content/uploads/2019/09/HAR-4-66-2019-Pesticides.pdf

HAR §4 Ch. 72:
https://hdoa.hawaii.gov/wp-content/uploads/2012/12/4-72-HAR-2012.pdf

HAR §16 Ch. 94
https://cca.hawaii.gov/pvl/files/2013/08/HAR-16-94-2022-02-07.pdf

FUNDAMENTAL APPROACH TO MANAGING PEST ANTS

IPM – COMBINING PHYSICAL, MANAGEMENT BIOLOGICAL AND CHEMICAL SOLUTIONS

Integrated Pest Management or IPM is a pest management approach that utilizes all available pest management methods to keep pest populations below pre-determined thresh-hold levels. Each pest management technique must be environmentally sound and compatible with producer objectives. IPM has several components that work together to allow the grower to develop the most efficient and effective pest management strategy:

1. Setting pest thresh-holds
2. Survey and scouting
3. Developing a multi-pronged pest management strategy
4. Monitoring outcomes

SETTING PEST THRESH-HOLDS

Often, the presence of some pests in a production system causes no economic harm, and sometimes, the presence of even one pest individual is too many. In the case of pest ants as a quarantine problem this means **the pest thresh-hold must be zero**. Knowing what pest loads are present, and the identity of the species is therefore an important factor in deciding whether or not to take action. The best way to get this information is through regular scouting or pest surveys.

Survey and scouting

Regular survey and scouting are essential in any integrated pest management system. Surveying for ants is not difficult and there are three good methods of doing so. In Hawai`i, where it is warm all year round, area-wide surveys should be conducted at least annually when species of concern have never been detected or suspected and at least twice a year where times a year (at least twice).

1. Visual searching

Inspecting the outside and inside of the pots, root balls, and foliage when repotting is important because of the limitations with lure-based surveys (described below). Check both the underside of the pot and that part of the bench or ground where the plant was sitting. Any ants scurrying away can be caught using a piece of scotch tape. Simply press the tape down onto the ant and stick it onto a piece of paper or scoop them into a small container or zipper sandwich bag with as little debris as possible. If plants are root-bound, tapping the root-ball onto the bench will help to dislodge ants living in the potting medium.

Visual inspections are not a surrogate for lure-based surveys, but are an easy additional preventative step that increases the chances of early detection.

2. Survey for Little Fire Ants

There is a protocol for survey of Little Fire Ants in the appendix 1 starting on page 17. This entails placing chopsticks or popsicle sticks smeared thinly with some peanut butter into shady spots around the nursery. Intervals of 15-20ft are ideal when LFA have not been previously detected and are not expected. Closer spacing is suggested whenever there is concern LFA may be present in or around nursery stock. Leave the
chopsticks for about 60 minutes, then collect and place them into zip-lock bags. It is helpful to use separate bags for different sections of the nursery and not place too many sticks per bag. Clearly label all bags with survey sticks to retrace back to locations where Little Fire Ants were detected once the ants have been identified and results received.

3. Complete ant survey

Different ant species are attracted to different kinds of food items. Some like sweet things, other prefer proteins and some like oils. A survey for all ant species means it is necessary to use three different kinds of baits. This can be done by modifying the Little Fire Ant survey to use different bait types. Instructions for this can be found in appendix 1 starting on page 18. After the survey, they must be frozen for at least 24h before they can be mailed in for identification. If dropping specimens off in person for identification, they should be frozen or preserved in alcohol. Try to avoid bringing live ants for identification.

Pest identification

Ants are unusual in a pest management context because there is no one-size-fits-all solution. Each ant species has a unique biology and often solutions need to be tailored to suit each individual species. For this reason, knowing which ant species are present in your production system is very important. We have over 50 ant species in Hawai`i, and most of these are not nursery pests. Only a handful poses problems for the nursery industry. A brief description of the main pest species can be found in appendix 4 starting on page 31. Fortunately, there are many identification resources available to growers. The Hawai`i Ant Lab, Hawai`i Department of Agriculture and island invasive species committees are all too pleased to provide identification of any ant species you might find during your scouting and survey activities. Once you know the identity of the ant species in your nursery, you are in a much better position to develop a plan of action.

Hawai`i Island

Hawai`i Ant Lab, Hilo
875 Komohana St #213
Hilo, HI 96720

Hawai`i Ant Lab, Kona
79-7381 Old Mamalahoa Hwy
Kealakekua, HI 96750

Maui Nui

Maui Invasive Species Committee
1000 Holomua Rd,
Makawao, HI 96768

Hawai`i Department of Agriculture
635 Mua Street
Kahului, HI 96732

O`ahu

Hawai`i Ant Lab
41-698 Ahiki St,
Waimanalo, HI 96795

O`ahu Invasive Species Committee
743 Ulukahiki St
Kailua, HI 96734

Hawai`i Department of Agriculture
1428 S. King St
Honolulu, HI 96814

Kaua`i

Hawai`i Department of Agriculture
Plant Pest Control
4398 Pua Loke St # A,
Lihue, HI 96766

Kaua`i Invasive Species Committee
7370K Kuamo`o Rd,
Kapa`a Hawai`i 96746
808-821-1490 https://www.kauaiisc.org/

PHYSICAL FACTORS

NURSERY DESIGN AND LAYOUT

The nursery industry in Hawai`i is very diverse and ranges from large, high-volume wholesale enterprises, smaller retail establishments that sell direct to the public, to hobbyists who grow plants and sell them at farmers markets and other venues. Your nursery layout has probably "evolved" over the years as your business grows, shrinks, or changes according to market demands. The gradual changes to nursery layout over time result in three key design elements that hamper pest management.

The first is the lack of a **clear boundary** between the growing area, diversified use areas, fallow areas, and neighboring properties. Ants do not respect boundaries, and without a clear buffer surrounding high priority areas, it can be difficult to manage pest ants. Buffers should be at least 10ft wide to provide a physical barrier that helps to protect growing stock by removing nesting habitat and food sources. If ants can infest or re-infest your growing area from bordering lands, all your efforts could be wasted. If at all possible, establish a cleared buffer around your priority areas and have a plan in place to ensure only clean stock and materials are brought into that area.

The second common design element many nurseries have, is the use of **wind-breaks** or planted areas through the nursery or adjacent to greenhouses or growing areas. These windbreaks often contain palms and other tropical trees. While they may look attractive and serve a useful purpose, they are also a harborage for pest ants and other plant pests. Often it becomes very difficult to manage ant populations when windbreaks are close to growing areas. This is especially of concern in regards to Little Fire Ants due to their propensity for nesting high in trees and palms in addition to ground level.

A final aspect of nursery layout that can hamper pest management is the presence of "fallow" areas – growing beds or shade-houses containing old pot-bound stock, accumulations of supplies and

equipment that are not being used, and unused space in general. This build-up of "stuff" that might be useful one day, unused growing beds or shade-houses are a haven for pest ant populations to establish and develop. Because these areas do not get much attention, they serve as a quiet place for pest populations to build-up unnoticed.

So, wherever possible, design or change your layout to incorporate cleared buffers around and throughout your property to protect high value and high priority areas. Remove unnecessary windbreaks and other vegetation, and keep unused areas of the nursery as tidy as possible to reduce nesting habitat. These changes can appear to be a daunting task for large, established operations. However, they will greatly reduce the cost and time needed to manage pest ants in your operation. If major changes are needed to make necessary changes, it's best to draft a written plan with timeframes and tackle the changes systematically and in manageable chunks over time.

HABITAT REDUCTION

The previous section deals with changing the basic layout of a nursery operation to reduce the amount of effort needed to manage nursery pests. It goes hand-in-hand with reducing available habitat. Nursery operations can be frantic and diverse as you respond to market demands. Growing a number of different products with market demands that ebb and flow

often results in an accumulation of equipment and supplies necessary for each aspect of your business. One day you need a 1000 1-gallon pots and next week demands change and the left-over pots sit somewhere gathering moss. And... pest ants. Accumulations of pots, cinder, peat and other supplies that are left idle until they are needed, provide excellent habitat for pest ants to establish and spread. Often these piles of unused items are left adjacent to growing beds, shade-houses, etc. where they pose the biggest threat to your growing stock.

Wherever possible, keep these items organized, and if possible in some central location away from production areas. Spaces around shade houses etc. should be clear of equipment, supplies and dunnage. Not only does this prevent ants from sneaking in to your stock, it will make managing these pests much easier and more cost effective.

MANAGEMENT FACTORS

STOCK AND GOODS INWARD

While buffers help to minimize the risk of ants invading your space from neighboring infested areas, they do not protect against the "human element". One of the main pathways for pest ants to enter your nursery is through goods moving into the nursery production system from elsewhere. Ensure the quarantine area is large enough to accommodate the operational needs and be established in a separate location than the production area.

Items such as stock, pots, potting media, landscaping material, items for resale, etc., all potentially harbor pest ants. Any materials coming onto the property should be first held in a quarantine area and thoroughly inspected and surveyed to ensure they are ant free. Refer to the survey protocols at the end of this manual for appropriate methods. Plants being purchased from other nurseries, returns from customers or landscaping projects, pallets of new supplies, and used equipment can become infested while they are outside your nursery and should be considered suspect until verified they are "ant free".

All incoming items should be held in a quarantine area for at least 7 days and inspected and surveyed at least twice throughout that timeframe. If ants of quarantine concern are detected during quarantine, they should be treated and held for continued inspection and surveillance an additional 7 days or longer and until the items are verified "ant free". Items entering the quarantine area should NOT be surveyed immediately upon arrival as ant disturbed during transport are not likely to be foraging or displaying normal behaviors. Allow items to sit, undisturbed, for at least 3-4 hours before inspection and survey. Barrier sprays may be applied to contain or prevent any ants of quarantine concern from establishing within the quarantine area. When used properly, a new pest will appear within your quarantine area first and you can prevent it from establishing in your nursery operation.
Trucks, machinery and employees' vehicles can also harbor ants. Again, ensure a designated car park is used for these vehicles and either survey regularly, or better yet, treat lot with barriers sprays EVERY 3 MONTHS.

WORK FLOW, PRODUCTION FLOW

A defined work flow is also important, especially when you have production or growing areas you use to harvest cuttings and other propagule materials. It's a good idea to chart out how things move around and within the nursery and keep these flows well-defined. As stock moves from one part of the production line to the next, there are different risks of contamination. If there is a pest problem that becomes too difficult or expensive to control, it may be possible to design a management plan addressing the specific risks associated with different stages of the production line.

CHOOSING BATTLE LINES

Nursery enterprises are sometimes very large and can span many acres. Treating these larger enterprises can be costly and time consuming. In planning your management efforts, you might have to identify priority areas and tackle those one or two at a time. Ultimately, the goal is to keep all production areas ant free, but dividing efforts into strategic portions over time will be more manageable

BIOLOGICAL SOLUTIONS

For many insect pests, the introduction of natural predators or pathogens is an effective and low-cost solution. There are thousands of very successful biocontrol programs that save agriculture millions, even billions of dollars per year. However, most insect pests are solitary – they live out their lives with little or no contact with other insects (except for mating). This means a natural predator, for example, can reduce the pest problem one insect at a time.

Ants are one of the few insect families that live together in a social colony. Each ant has a specific task, and most foraging ants (the ones we actually see) are the older workers assigned to the high-risk task of finding food. A large portion of the colony stays out of sight. All the workers are sterile daughters of a queen. The workers protect the queen and normally she is very difficult to find.[1] If some workers are killed during foraging, by a natural predator for example, the queen simply lays more eggs to replace those lost workers.

Research of potential biocontrol agents against Little Fire Ants is in its infancy and to date, no strong candidates have been identified and tested. The history of biological control efforts against ants in general has met with mixed success. Three or so species of phorid fly have been released in southern USA to combat the Red Imported Fire Ant (not the Little Fire Ant). They appear to have established well, however, the impact on the Red Imported Fire Ant population has been only slight. Other agents that have been researched for their effect on Red Imported Fire ants include several species of protozoa and a species of fungus. This work has been progressing for some years but at this time has not resulted in a miracle cure. However, all the biocontrol agents, together, may reduce Red Imported Fire Ant population somewhat, but not eliminate them.

CHEMICAL TREATMENT OPTIONS

The array of insecticides on the shelf at your local garden store or chemical supplier can be mystifying. There are dozens of different proprietary products available and it can be very difficult to know which is the right one for your situation. Some are liquids, some are granules, they can be in small bottles or huge bags, in ready to use spray bottles or concentrates…So, which one do you buy?

Pesticides for ant control can be divided into three main types: baits, barrier treatments, and contact sprays. Each of these work differently and it's important to know which is which.

Ant baits

Baits are an attractive food laced with a toxin (usually a very small amount). Most baits for outside use are in a granular form to make them easier to spread. Liquid baits are mostly used inside a home in bait stations. Ants harvest baits and take it back to the nest where it shared with the rest of the colony. Once the toxin takes effect, most or all of the ants are killed. Different ant species prefer different food types, so it

[1] Some ant species, for example Little Fire Ants, can have many queens within each colony.

is important to match up the bait with the ant species you are trying to control.

Baits are the recommended first-line treatment because they are very effective, reduce non-target impacts, and also minimize the use of pesticides.

Most baits for outside use are in a granular form to make them easier to spread. The granules are usually made from corn grits and the toxin is added to these during manufacture. Although they are not harmful to pets and other animals, birds and chickens might find them attractive. If you have chickens on your property, remove them from the sites you are treating or spread the granules late in the afternoon just before your chickens roost.

Little Fire Ants often nest in the foliage and branches of trees. These may not be well-controlled with standard granular bait applications, because the tree-dwelling ants do not always forage on the ground. Most baits are granular and are not suitable for treating tree canopies, palm crowns, and other tall vegetation. Hawai`i Ant Lab's gel bait with **Tango™** can be applied to trees and tall vegetation within the nursery, such as wind breaks and landscaping. For more information on the Hawai`i Ant Lab Gel Bait, see Fact Sheet 8 (appendix 2).

Barrier treatments

Barriers can come in a spray form or a granule, and can be applied to the soil, hard surfaces or vegetation. They contain a toxin that has a residual effect and can stay active for a month or even longer. Once they are deployed, any ants that wander across a treated surface will come into contact with the chemical and die.

It is easy to confuse granular pesticides with granular baits, so it is important to read the label carefully. Many granular pesticides contain synthetic pyrethroids. The active ingredient list will usually contain one or more chemicals with names ending in "- *thrin*", like "bifenthrin", "cyfluthrin" etc. Granular barriers also need to be watered before they are activated, while baits often become unattractive and ineffective when they get wet.

Contact sprays

Contacts are used to directly spray a target pest. They are useful for spraying spiders, flies or other bugs that you discover in your home. Often contact sprays are sold in pressurized aerosol cans which can be aimed at the offending insect or spider.

WHOLE OF NURSERY (NURSERY **NOT** CURRENTLY INFESTED WITH ANTS)

If there are no ants of quarantine concern present in the nursery, it is good practice to keep it that way. This avoids having problems at a later time. There are three activities that a grower should do:

1. Regular surveys of the nursery
2. Application of ant baits and/or residual barrier sprays around high priority production areas and throughout quarantine areas.
3. Incorporating residual insecticides into the potting media during repotting at every stage

Surveys

There are many ways that ants can enter the nursery system including: purchase of infested plants, potting media or other items, ants traveling on cars and trucks driven by staff, customers and delivery vehicles, and ants spreading from a neighboring property. Good nursery quarantine procedures, hygiene, and designated parking can reduce the risk of the first two pathways, but natural spread from an adjoining property is more difficult. Additionally, with Little Fire Ants and other quarantine pests spreading across the state, there is no 100% "safe" source of plants and materials. Even certified nurseries could potentially sell infested stock unknowingly. It is important to conduct regular surveys of high-risk areas within the nursery such as car parking areas, quarantine areas and the nursery boundaries. This can be done quickly and easily using the survey procedures on page 12 of this manual. The recommended frequency of this survey type would be 2-4 per year, with at least one survey conducted over the entire property. These survey activities should be backed up by regular prophylactic treatments.

Prophylactic treatment

Prophylactic treatment refers to treating an area for a pest although it "probably" is not infested. It's a good approach to take because ant infestations, when colonies are just starting to spread, can be very difficult to detect with a survey. These treatment types can be done using baits and/or spraying residual pesticides. Baits are preferable for large area treatments but residual barrier insecticides are best to contain or exclude crawling pests like ants. Some residual pesticides also come formulated for media incorporation. When used as part of the standard re-potting process, these products will prevent ants and other soil insect pests from infesting the plant stock.

WHOLE OF NURSERY (NURSERY **IS** CURRENTLY INFESTED WITH ANTS)

If ants of quarantine concern have infested the nursery, there are two options open to the grower. The first option is to eradicate the ants from the entire nursery, the other option is to eradicate the ants from those sections of the nursery that are most critical – the sales floor, export benches and surrounding areas, packing and processing areas. Selective control is only suggested on Hawai`i Island where quarantine pest ants, such as Little Fire Ants, are well established and widespread. Nurseries on Maui, O`ahu, and Kaua`i should strive for area-wide control or eradication. The Hawai`i Department of Agriculture and island invasive species committees are available to assist wherever possible to achieve this goal.

Treating an entire nursery is preferable because there is greater certainty that any plants sold or moved from the nursery are ant free. Depending on the type of operation being carried out, either baits, chemical sprays or both can be used. Baits tend to be least expensive, take less time to apply and are more effective over larger areas. An additional benefit is that far less insecticides are used because baits are directly targeted at the ant rather than being applied everywhere.

BAIT THEM FIRST, THEN BLAST THEM

The best way to manage Little Fire Ants throughout a large area (i.e. entire nursery) is to use a dual approach of baiting and barrier treatments. It is important to use them properly and strategically, because even small differences to your application method can lead to big differences in results. First, NEVER apply a bait and a barrier treatment at the same time. Why?... Well, baits work when ants bring them back to the colony and share them with all the workers (and also to tell the others where to get more bait). If a worker ant is carrying some bait back to the nest and crosses over a barrier treatment, she will die before being able to get back to the colony. One treatment will cancel out the other and you will be wasting your hard-earned cash.

Figure 1: Available options for granular bait application. Hand-held "whirly bird" style seed spreader (a) and backpack style gas-powered duster (b)

BAITING BASICS

Always read the label directions for the product you intend to use. The label is a legal document and specifies what you can and cannot do. It will also list any precautions you should take and any personal protective equipment (PPE) you should wear while mixing and applying the product.

There are pros and cons to each of the baits listed. If you have questions on which bait is right for your specific situation, please call or email the Hawai`i Ant Lab for free site-specific consultations.

The Hawai`i Ant Lab has tested several bait products available in Hawai`i. Some are good and others, not so good. The following granular bait products are ***labeled for use in greenhouses and commercial nurseries***:

- **Siesta™ Insecticide Fire Ant Bait** is sold at chemical supply companies. It is a little more expensive than other products but it appears to remain attractive to ants even after it gets wet unlike other granular baits. This product contains a soy oil attractant and is attractive to grease-loving ants, like LFA.
- **Firefighter®** Fire Ant Bait is a granular bait recently registered for use in Hawai`i. It has the active ingredient of Spinosad, and has some edible crops on the label. This product contains a soy oil attractant and is attractive to grease-loving ants, like LFA.
- **Amdro® Pro Fire Ant Bait** is sold at chemical supply companies. Amdro ® is one of the original manufacturers of fire ant baits and this product is tried and true. However, this product is highly sensitive to moisture and loses all attractiveness when it gets wet. It's important to not irrigate an area within 4 hrs. of bait application to ensure efficacy. This product contains a soy oil attractant and is attractive to grease-loving ants, like LFA.

The baits most suitable for control of Little Fire Ants all look very similar – small yellow granules around ⅛ inch in size. The granules are actually corn grits which have been infused with vegetable oil and a toxin. They can be applied using a small fertilizer spreader (fig. 1a) or with a gas-powered duster (fig 1b).

The "whirly bird" style hand-held seed spreader work great for small-scale application (under 1 ac of treatment area). These are available at low cost from hardware and pesticide stores and come in manual or battery-powered models.

Granular baits are applied at very low application rates (usually 1.5-2 lbs. per ac) and this can be challenging to achieve with the seed spreader. Bait is applied so diffusely that it often seems like you didn't apply enough. Regardless, you CANNOT apply more than what's indicated on the product label. It's a good idea to calibrate your equipment in order to achieve an even distribution throughout the treatment area. Start with the aperture set at "1" (see above) turn the spreader handle at approximately 1 revolution (or pull the trigger in brief pulses for battery-powered models) per step while walking at a moderate pace. The bait will fling out and create a swath of about 3 yards.

Common mistakes a lot of people make is to only spread bait in places where they have "seen" ants and treating inconsistently or with too long of a re-treatment interval. Keep in mind that LFA have lots of small nests and often we do not know where they all are. For the best long term control the entire production area and sales floor should be treated. Nursery-wide treatments should not be a "life-long" effort. A full treatment regimen lasts for 12 months with baits being applied every 4-6 weeks. Another common mistake is to bait again too soon. The ants that survived the first round of baiting can remember that those little yellow granules made them sick last time, and will actually avoid taking your baits the next time around. Keeping with a 4-6 weeks retreatment interval will maximize results while also minimizing efforts and supply expenses.

- ***Read the label***
- ***Do not use old bait***
- ***Treat in dry weather***
- ***Treat your entire property***

If done properly, you will see significant results within the first 6 months and long-term lasting results will be achieved in 12 months. Treatments done haphazardly, inconsistently, or with too much time between

treatment cycles will lead to poor results and recurring issues.

When applying the bait over your property (including green houses and shade houses), work in a systematic way throughout the area (fig. 2). Many nurseries are divided into blocks and sub-blocks. Walk up and down rows in each block or sub-block in a way that does not lead to a lot of overlap of treatment. For handheld seed spreaders you might walk up every-other row because the application swath is only approximately 1.5 yards on either side of you. If using a gas-powered duster, you may be able to treat 3-5 yards on either side (depending on calibration settings) allowing you to walk up every 3rd or 4th row. Ultimately, you want to just a slight overlap of bait during each pass up and down the rows of nursery stock. It's better to under apply and have to go back through a second time than it is to over apply and run out of bait. Remember, you cannot exceed the amount indicated on the label for your application method.

Figure 2: Example of how to treat an entire nursery by dividing it into workable blocks. Treat blocks by walking up and down rows, then treat the walk ways. Green houses and shade houses should be treated in the same manner.

Due to Hawai`i 's humid climate, granular baits will quickly deteriorate and become rancid once opened. Make sure to use all of the bait from any opened container or bag within 2-3 months after opening. For the same reason, make sure to inspect bags of bait and the seals on containers when purchasing to ensure the bags are not punctured and seals are secure. Unopened bait containers and bags should be stored in a cool dark or shady space to avoid spoilage and degradation of the active ingredients due to heat exposure. Bad bait will not be attractive to ants and they will not feed on it. Most baits come in different pack sizes. Purchasing bait on a quarterly basis rather than stockpiling product is a good way to make sure your bait will always be fresh.

- **Weigh out the amount of bait you'll need for your treatment area.**
- **Do not apply more than the labelled amount allowable on the product label under "BROADCAST USE".**

You cannot use application rates for other use patterns (mound treatment, band or perimeter treatment, etc…) when applying bait via broadcast.

Rainfall, irrigation, and dew will make the bait soggy and unattractive to ants. Make sure the ground is dry and try to pick a dry day for applying baits. In places with frequent, a dry period of around 4-6 hours after treatment should be sufficient time for ants to find the granules and take them to the nest. Do not irrigate for at least 4-6 hours after application. After a day or so, the baits are no longer effective, even without rainfall.

PROTECTING STOCK

Ant baits work over time and multiple treatments necessary to ensure all workers and all queens are killed. This is an effective method for area-wide control of LFA. Although it is preferable to have an ant-free nursery, and therefore ant-free plants, there may be times when the grower has infested stock needing an effective rapid treatment in order to be sold or distributed. In this case, individual pots may be treated prior to sale using a residual insecticide as a protective measure while the surrounding nursery is undergoing long term treatments.

There are three main methods for treating plants: 1) dip, drench, and spray with an insecticide; 2) adding controlled release chemicals to the potting media before use; 3) heat treatment immediately prior to

shipment. Each has advantages and disadvantages. The first two options require known bulk density in order to calculate the correct application rates. The third option, heat treatment, may not be suitable for sensitive plants

To calculate your bulk density:

- **Fill a measuring tub exactly to the one-quart mark with your potting mix compacted as you would for a potted plant.**
- **Dry the measured amount in an oven turned on low until no water remains and the mix is perfectly dry. Weigh the dry mixture using a postal scale or good kitchen scale.**

Dip/drench/spray options

Ants can nest and live in either the potting medium, or the foliage of potted plants (sometimes both). Therefore, the entire plant needs to be treated. The most common product available for this is Talstar® Select, (which contains bifenthrin).

Talstar® Select

This is a restricted use pesticide product (EPA reg. 279-3155) and is registered for use in nurseries by licensed applicators only. It can be used as both a spray and a drench for potted plants, however the rate depends on the bulk density of your potting medium. Talstar® Select, applied at this rate provides up to six months control of insects in the

For Talstar® Select, there may be equivalent generic versions available at your chemical supplier, But, always follow the label carefully and make sure any product is labelled for use in nursery operations. Each pot needs to be drenched with at least 1/5 of the pot volume for treatment to be effective.

Weight of 1 quart dried medium (oz)	Talstar® Select per 100 gallons water (fl. Oz.)
6.9 or less	24
7.0-11.5	4.8
11.6-20.7	7.2
16.2-20.7	9.6
20.8-25.3	12.0
25.4-30.0	14.4

Table 1: Quick reference guide to Talstar® Select application rates for specific bulk densities. This table is not a surrogate for application rates on the product label and applicators are fully responsible for abiding by current label requirements. Applicators should double check current labeled rates in the event changes have been made.

Potting media treatment

It is possible to "pre-treat" the potting medium during re-potting and up-potting. **Talstar® Nursery** is a granular residual pesticide formulated for this purpose and can be used without the need for an applicator license. Currently, no generic alternatives for Talstar® Nursery are known or available in Hawai`i. However, if reading this document at after 2024, please check with your chemical supplier for new products that would serve this same purpose and refer to the product labels for correct application and dosages. Talstar® Nursery can be dosed to exclude ants for period exceeding two years. Again, the bulk density of the potting medium determines how much Talstar® Nursery will be needed. Also, more product is required as the desired length of protection increases. These products MUST be incorporated with the potting media at the time of potting. They **cannot** be used as a soil surface application. Use the table below to calculate how many pounds need to be added to each cubic yard of potting medium.[2]

Weight of 1 quart dried medium (oz)	lbs. Talstar per cu. yard			
	6 mo.	1 yr.	2 yr.	>2yr
6.9 or less	1.0	1.2	1.5	2.5
7.0-11.5	2.0	2.4	3.0	3.5
11.6-16.1	3.0	3.6	4.5	7.5
16.2-20.7	4.0	4.8	6.0	10.0
20.8-25.3	5.0	6.0	7.5	12.5
25.4-30.0	6.0	7.2	9.0	15.0

[2] This product cannot be used on plants already potted-up. It must be added to the potting mix before use.

HEAT TREATMENT

UH College of Tropical Agriculture and Human Resources have developed novel heat treatment systems that can eliminate most, if not all living ants from potted plants. The system relies on heating the plant and pot to a temperature hot enough to kill ants but not hot enough to harm the plants. Keep in mind that hot water treatment facilities may not be available on all islands and different plants will have different heat tolerances to consider. Heat treatment is not suitable for all plants. Contact your local CTAHR Research and Extension Center for more information on heat treatment of potted nursery stock.

Figure 3: Hot water dip tank for treating nursery plants. Image provided by Dr. Arnold Hara, CTAHR.

Figure 4: Hot water spray container for treating nursery plants. Image provided by Dr. Arnold Hara, CTAHR.

SPECIAL CONSIDERATIONS AND CIRCUMSTANCES (LFA -SPECIFIC)

Little Fire Ants nest anywhere that provides enough shade and moisture to suit their needs. This includes natural and artificial habitats on the ground and up high. Other common LFA nesting sites at nurseries include but are not limited to, mulch and aggregate piles, stacks of pots, pallets of supplies, irrigation pump housing, underneath and between layers of weed mat and underlayments, moss and weeds growing on buildings and shipping containers, in palm crowns, in bark, moss, and epiphytes on tall trees (i.e. windbreaks and landscaping features), and more. Little Fire Ants will nest EVERYWHERE and some places are harder to treat than others.

DEALING WITH ANTS AROUND FOOD PLANTS

Many pesticides are not registered for use on food plants. This is because the Environmental Protection Agency has very strict guidelines for registering pesticides to be used on crops. Therefore, there are fewer options available for treating ants in food crops. Additionally, a product can only be used on crops explicitly included on the label unless it is exempt from EPA residue tolerances. Unfortunately, many tropical crops grown in Hawai`i are often not included on product labels leaving farmers and residents without legal recourse.

Because of this, it is especially important that nurseries maintain pest free stock and do their due diligence to not contribute to an already bleak situation. For the most part, nursery stock is considered "non-bearing"[3] and products that include "non-bearing nursery stock" can be used. However, when field grown trees or large potted stock have started to produce harvestable crops they are considered "bearing" despite being nursery stock intended for sale. In this case, only products labelled for both the crop in question AND use in nurseries can be used.

The products listed below are labelled for use in nurseries and include at least some crops as approved application "sites". These products have been tested and verified to be effective at controlling LFA. Your chemical supplier might have other products

[3] The EPA considers immature perennial crops as **non-bearing** only if it will NOT produce a harvestable crop within 12 months after pesticide application.

available, and in this is the case it's a good idea to contact the Hawai`i Ant Lab for efficacy information on the product in question. You don't want to be stuck with a product known to be ineffective!

No matter what product you use, be sure to read the label carefully to make sure your crop or fruit is listed. You can download product labels mentioned in this fact sheet by going to the Hawai`i Pesticide Information Retrieval System (HPIRS) maintained by University of Hawai`i College of Tropical Agriculture and Human Resources at Manoa. Baits available for use on or near food plants include the following:

- **Tango™** is registered for use on and under food plants also. The active ingredient in Tango™ is exempt from EPA residue tolerances and the product does not have a detailed crop use label. It contains the insect growth regulator Methoprene and should be mixed into the Hawai`i Ant Lab Gel Bait. This product is very effective and safe. Please read Fact Sheet 8 (appendix 2) to understand how Tango™ works, how to mix and apply it for managing LFA, and to find out if it is right for you.
- **Siesta™ Insecticide Fire Ant Bait** can be used on stone, pome, citrus and nut trees NOT in agricultural production.
- **Firefighter® Fire Ant Bait** has edible crops on the label; see label for details.

CONTROLLING ANTS IN TALL VEGETATION

Little Fire Ants nest in foliage, branches of trees, and epiphytes. Nests are often found high up in the crowns of tall palms and high up in the canopies of tall trees. Arboreal nests typically not be well controlled with granular bait applications, because the tree-dwelling ants do not always forage on the ground and the baits don't "stick" in the canopy. This is because Granular baits were developed for species that nest on the ground. The Hawai`i Ant Lab developed a homemade gel bait recipe (HAL Gel Bait) that can be mixed with certain pesticides or active ingredients to control LFA in trees, foliage, and other places where granules cannot be applied.

REMINDER:
Do **NOT** apply a residual barrier spray to an area that you are baiting. Barrier sprays will kill the ants and prevent them from bringing the bait back to the nest.

At this time, the only product that can be mixed in the HAL and used within a nursery boundary is **Tango™**. Tango™ is a non-toxic insect growth regulator (IGR) that reduces egg production and interferes with larval development; it does not kill the ants. It is a very effective treatment option but it takes time for the effects of an IGR to be noticeable. Because of this, the HAL Gel Bait with Tango is an excellent option for area-wide long-term control of LFA, but it is a poor choice when rapid population knock-down is necessary.

Outside of a nursery boundary the HAL gel bait with **Advion® WDG** can be applied. Advion® WDG is a toxicant that will kill ants and provide rapid population knock down. This product is NOT labelled for nursery use but can be use outside of the nursery to help push surrounding infestations away from the boundary.

For more information on **Tango™, Advion® WDG, and** the **HAL Gel Bait**, see Fact Sheet 8 (appendix 2).

CONTROLLING ANTS UNDER WEED MAT

One of the biggest challenges to controlling LFA in nurseries is dealing with ants under weed mat and between layers upon layers of plastic underlayment. This creates "safe havens" for LFA where barrier sprays don't penetrate and LFA might not forage on the surface as much as usual. A single layer of weed mat may not pose a big issue. If ants are suspected to be under the weed mat, surface baiting will likely be effective. A single layer of weed mat can also be pulled up and replaced after a residual barrier applied underneath. This would provide excellent, long lasting control of LFA and other species nesting under the weed mat.

When one or more layers of plastic sheeting is used as underlayments or when old weed mat is covered with new weed mat, it can be significantly more difficult to rid the area of LFA. Surface baiting may not be enough to fully control LFA within the layers or it may take considerably longer to rid the area of LFA. Habitat modification by removal of old layers, residual barrier application, and new weed mat replacement is always an option, but is a much larger task than with the above scenario. If you find yourself in this scenario, it is even more important to either drench your stock with Talstar® Select and/or incorporate Talstar® Nursery granules into your potting media every time you re-pot and up-pot nursery stock.

APPENDIX 1. ANT SURVEY METHODS

SURVEY TO TARGET LITTLE FIRE ANTS

Little Fire Ants (LFA) are the main ant species of quarantine concern for nurseries on the Big Island. A survey to identify if these are present in your nursery is fairly quick and easy using lures. Ants are always foraging around looking for sources of food. By placing the right type of food item at regular intervals, a foraging ant will quickly find it and soon the other ants in the colony join her in retrieving the food. By using lures, the ants come to you, rather than you having to search for them. The best lure for LFA is peanut butter, because they need the oils and proteins to feed the queens and the larvae.

You will need the following items:

1. Creamy peanut butter – LFA seem to prefer the cheaper brands of peanut better most
2. Wooden coffee stirrers or 5-dram survey vials with caps
3. Zip-lock bags
4. Bright-colored spray paint (fluorescent pink or orange is best) – optional
5. Permanent marker (to label bags and vials)
6. GPS or gridded map of the site to record sample placement

Conducting the survey

The coffee stirrers (sticks) and vials can be rather hard to find after they are distributed around the nursery, so it's best to mark sticks using spray paint (pink or orange is a good color) and/or use pin flags to mark placement so they can be easier to find. Once painted, smear the thinnest amount of peanut butter onto the sticks or as a single, translucent, stripe in the vial and place them at approximately intervals of 15 - 30 feet in a rough grid pattern through the area to be surveyed. Leave them out for one hour or so, then go back and retrieve them. Cap all vials with ants and place any sticks with ants on them into a small zip-lock bag and label the bag or vial with the grid location or GPS ID.

Ideal spots to place lures include the following:

- The base of plant benches
- On the media of potted plants
- The bases of trees
- In the crowns of palms or at the bases of older leaves on bananas,
- At the edges of buildings (especially the northern and eastern sides)
- Near or under piles of tree trimmings, stacks of old pots, cracks or splits in weed matting
- Under trees in wind breaks

A typical Little Fire Ant lure - chopstick with peanut butter placed in a shady area on the ground (a) and after 60min exposure time (b)

A typical Little Fire Ant lure - chopstick with peanut butter placed on a banana plant (c) and after 60min exposure time (d).

Tips for a better survey

- LFA like shady moist places – always try to place the lures away from the sun
- If you have a banana patch or palm trees, place at least some lures in these. The best location is where the older leaves join onto the stem, as well as in the trash at the base of the plant. There is an image in the presentation showing the best spot.
- LFA are VERY small, a uniform orange color, and walk fairly slowly. If the ants you see are black, or fast moving, or are more than one color, they probably are not LFA.

Little Fire Ants are

- Very small – probably the smallest ant you have seen. They are only about 1.5mm in length.
- An orange-red color all over
- Slow moving unless disturbed
- Will often fall from the chopstick as you pick it up

SURVEY TO TARGET ALL ANT SPECIES

Every ant species has their own preferred types of food. Peanut butter works well for ants that like oily foods, but some ants prefer sweet foods and other ant species like only proteins. In order to survey for all ant species, it is necessary to place a wider variety of lures.

The survey method for Little Fire Ants is quick and easy. It can be modified to capture a wider variety of ant species by placing a wider variety of food types.

For this type of survey, you will need the additional items:

- Tinned meat (water packed tuna, chicken, luncheon meat, etc…)
- Clear Jelly (any flavor), cane sugar, or sweet corn syrup

A can of tuna (water packed), canned chicken, or luncheon meat. Using one-part cane sugar or corn syrup, blend with 3 parts warm water to make a light sweet liquid. Blend the meat in a separate container with enough water to make slurry (like a meat smoothie). Prepare ⅓ of the sticks with each lure:

- Peanut Butter lure: Smear the thinnest amount of peanut butter onto the sticks or as a single, translucent, stripe in the vial
- Sugary lures: Dip the unpainted end of the sticks into the sugary liquid and soak for at least an hr. If using vials, smear the thinnest (translucent) stripe of undiluted corn syrup or jelly in the vial
- Tinned meat: Dip the unpainted end of the sticks into the "meat smoothie" and soak for at least an hr. If using vials, you can use a tiny chunk of meat instead of the "meat smoothie"

Now conduct your survey as before, but place the different lure types in an alternating pattern: one peanut butter, then a sugar lure, then fish. Collect them as before. The fish lures will become unpleasant to handle if left unfrozen, so please make sure to leave them in the freezer until just before bringing or mailing them in for identification.

You can divide the nursery area into sections and place all the chopsticks from one section into the same zip-lock bag. Don't forget to write the location onto each zip-lock bag. Once you have collected all the lures, place the bags in the freezer overnight and bring or mail them to the Hawai`i Ant lab for identification:

Hawai`i Island

Hawai`i Ant Lab
875 Komohana St #213
Hilo, HI 96720
PH: 808-315-5656

Hawai`i Ant Lab
79-7381 Mamalahoa Highway
Kealakekua, HI, 96750
PH: 808-209-9014

Maui Nui

Maui Invasive Species Committee
1000 Holomua Rd,
Makawao, HI 96768

Hawai`i Department of Agriculture
635 Mua Street
Kahului, HI 96732

O`ahu

Hawai`i Ant Lab
41-698 Ahiki St,
Waimanalo, HI 96795

O`ahu Invasive Species Committee
743 Ulukahiki St
Kailua, HI 96734

Hawai`i Department of Agriculture
1428 S. King St
Honolulu, HI 96814

Kaua`i

Hawai`i Department of Agriculture
4398 Pua Loke St # A,
Lihue, HI 96766

LFA FACT SHEET 8

(VERSION 9.3 MAY 2025)

MIXING HAL GEL BAIT FOR CONTROL OF LITTLE FIRE ANTS

Visit
littlefireants.com

or contact
Hawai`i Ant Lab
808 315 5656

Pacific Cooperative Studies Unit, University of Hawai`i
875 Komohana St
Hilo, HI 96720

BACKGROUND

Ants are notoriously difficult to control around houses and other structures. Often, the use of toxic sprays and dusts has little effect. Some workers will be killed, but the ant colonies recover very quickly, and this often leads to a cycle of spraying to gain temporary relief, a fast recovery by the ants and spraying again. Decades ago, scientists researching better ways of controlling ants found that using a bait was more effective. Baits are made from a food that is attractive to ants and laced with a small quantity of slow-acting toxin. Worker ants feed on the bait, and when they return to the nest, regurgitate some to share with other workers and the queen. This approach has proven to be more effective than toxic sprays and has an added benefit of minimizing the use of pesticides.

To be effective, a bait must be attractive to ants and contain a toxin that is slow acting and effective in low quantities. If the toxin works too quickly, the worker ants become sick before returning to the nest and will not share the bait with other workers in case they also get sick.

The Little Fire Ant (*Wasmannia auropunctata*) is very difficult to control. They have many small colonies, each with many queens, and will have nests on the ground as well as in trees and other vegetation. All these small colonies are inter-connected and if some die out, they are re-populated by neighboring colonies. One problem facing the homeowner is that virtually all commercial baits consist of small granules. These are easy to spread on the ground, but cannot be applied to vegetation. Ants in the trees will not necessarily come to the ground to forage on the granules. If only the colonies on the ground are treated, neighboring ants living in trees will quickly spread back to the ground. The bait granules are also inactivated by rainfall. Once the granules become soggy, they are no longer attractive to ants. Windward locations in Hawai`i often experience regular and frequent rain. In some locations it is difficult to predict if it will rain on any given day.

WHY USE A GEL BAIT?

Contrary to popular belief, worker ants do not eat solids - they only consume liquids. Most granular baits are made from corn and vegetable oil, and when a worker ant finds a bait granule, she often sucks the oil out of the granule and leaves the rest behind. Ants can consume a gel bait far more easily than a granular product.

Baits in liquid or gel form do not have the same limitations as granular products. They can be applied to vegetation where they will stick to the leaves and branches and are not affected as much by rainfall. They are, however, a bit more difficult to prepare and apply compared with granular baits.

Hawai`i Ant Lab has developed a basic gel bait recipe that can be used with a variety of active ingredients to suit the individual needs of homeowners. The HAL gel bait is made with common household food ingredient like vegetable oil, water, peanut butter, and xanthan gum (a common food thickener and emulsifier).

LEGAL STUFF YOU NEED TO KNOW

Although HAL's Gel Bait is designed to be used with an active ingredient of the user's choice, there are only two products labeled for this use in Hawai`i. These are Tango™ (an insect growth regulator), and Advion® WDG (a toxicant).

The use of anything that acts as a pesticide, including ant baits, first needs to be registered by the Environmental Protection Agency as well as pesticide regulators in your state. The EPA registration process may take years and is generally a costly exercise. The reason for this is that any pesticide needs to be carefully reviewed and tested to make absolutely sure it is safe as well as effective. Safe for you, the environment, and other people.

OPTIONS FOR ACTIVE INGREDIENTS

There are a couple pesticides that, added to the HAL gel bait, are effective at controlling Little Fire Ants. The amounts needed are listed in a table at the end of this section. Only mix one pesticide choice in a batch of gel bait: Tango™ OR Advion® WDG.

TANGO™

Tango™ is a concentrate product that contains **(S)-Methoprene**, an insect growth regulator (or IGR). The label provides instructions for mixing the concentrate with a bait matrix. The manufacturer has also issued a 2(ee) recommendation that provides specific instructions for treating Little Fire Ants.

The IGR group of chemicals work by preventing affected insect larvae from completing the pupation process but has no effect on adult worker ants. It also prevents or slows down egg production by the queen. Ant colonies baited with an IGR slowly die out over a period of months as worker ants die from natural causes.

One big advantage of **(s)-Methoprene** is that it is one of the safest insecticides available today. For this reason, it is often used for insect control in food crops and even drinking water. Additionally, it is extremely effective as an ant bait when used correctly. The main disadvantage of this product is that it takes longer to control insect pests because only egg production and larvae are affected, while the adults can live on. In today's world we often expect quick results and for some people 3 months is a long time to wait for results.

The slow mode of action typical of **(s)-Methoprene** baits will mean that you will continue to see ants for 3-4 months, or even longer. Be patient, and repeat treatments every 4-6 weeks for several months. The repeat treatments will ensure that all colonies are properly treated. If only some colonies are controlled, the surviving ones will spread very quickly and all your efforts will have been in vain.

After a few months of treating with IGR's you may start to see fewer workers, but an awful lot of winged queens, which are larger than the workers. DON'T PANIC! This is a normal side effect of IGRs. It's a sign the bait is working! Pat yourself on the back and keep up the good work.

ADVION® WDG

Advion® WDG is a water-soluble granule that contains the active ingredient **indoxacarb**. This active is in a new class of chemicals known as oxadiazines (a sodium channel blocker). Ingestion of **indoxacarb** by insects leads to their paralysis and eventual death.

The manufacturer of Advion® WDG has applied for and been issued with a "Special Local Need" permit (or SLN) which allows users in Hawai`i to add Advion® WDG to the HAL gel bait for control of Little Fire Ants.

Advion® WDG is fast acting and usually dramatic results will be noticed in as little as 2-3 days after treatment. However, Advion® WDG is not registered for use on food plants or within the drip line of food-bearing trees nor for ground treatment.

If Advion® WDG is your bait of choice, understand that Advion® is a line of products in liquid, gel, and granular form targeting different types of insects depending on which product you select. The only Advion® product approved for use in the HAL gel bait for the control of Little Fire Ants is **Advion® WDG**. It is prohibited to mix other Advion products (Advion® Fire Ant Bait, Advion® Ant Gel, Advion® Insect Granular Bait, etc.) into the HAL gel bait.

CORRECT DOSAGE

"The dose makes the poison" Paracelsus, the father of modern toxicology (1493-1541)…

It's easy to think that if a little bit is good, more must be better. As far as bait products are concerned, this is definitely not the case. Some pesticides are repellent at higher doses, but not detectable at lower doses. Other chemicals act too quickly in high doses, not giving worker ants enough time to share the bait with nest-mates. Additionally, using pesticides at higher rates than listed on the label contravenes pesticide use laws and regulations.

TREATMENT FREQUENCY

We are often asked "*how often should I treat?*" This is actually a very good question. From experience (and some experimentation) Little Fire Ants seem to be able to completely recover from a single bait treatment in 8-10 weeks. The reason they can recover so quickly is that there are many queens in the colony, so even if some are killed by a treatment, the remaining queens simply increase their rate of egg production until the population gets back to normal levels.

However, when we apply a bait product, the surviving ants learn that the baits are toxic to them and will avoid feeding on that bait. This "memory" stays with the colony for around 4-6 weeks (we don't know the exact length of time).

So, the next treatment needs to be sooner than the time it takes for the colony to recover, but not so soon that the ants will avoid the baits. We recommend that people treat every six weeks to fit between these intervals.

THE GEL RECIPE

Before mixing the gel bait, there are a few things to think about. First, this is **NOT** a job to be done in your kitchen, or using bowls and measuring cups that will later be used to prepare food. Buy all these items specifically for this purpose, mark them "Not for Food Use" or "Pesticide Use Only" and keep them in the garage or wherever you normally keep your yard care products or other chemicals. Also, make sure you have adequate protective equipment as follows:

- a sturdy pair of rubber or chemical resistant gloves,
- a chemical resistant apron,
- eye protection, and
- access to a faucet and soap for washing your hands etc. after mixing.

Also, read the pesticide label very carefully before starting and make sure you follow all directions and precautions listed. Although the pesticides we recommend are very safe, it is good practice to wear protective equipment whenever handling and mixing pesticides, no matter how benign. You never know if you are chemically sensitive or even allergic to a particular product.

INGREDIENTS

In addition to a pesticide, The HAL gel bait is essentially a mixture of vegetable oil, water, a protein attractant, and a thickener/emulsifier to keep everything mixed together. The table below shows the proportions you will need, depending on the quantity you wish to make. (**All quantities are by volume**). We have rounded the quantities to make it easier to mix.

ingredient — Approximate finished quantity

	1 quart	**1 gal**	**2 gal**	**4 gal**
Water	2 ¼ c	2 ¼ qt	4 ½ qt	9 qt
Xanthan gum	2 tsp	2 ½ Tbsp	1/3 c	2/3 c
Peanut butter	1 ½ Tbsp	6 ¼ Tbsp	3/4 c	1 ½ c
Corn oil	1 ¼ c	1 ¼ qt	2 ½ qt	5 qt

When mixing, you need to add the pesticide of your choice to the mixture. It is important that the pesticide rate is exactly correct (or just slightly under the required amount. Using more than the label rate of pesticide is not legal).

Pesticide quantities needed

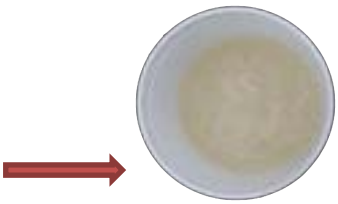
	1 quart	**1 gal**	**2 gal**	**4 gal**
Tango™	3 Tbsp	¾ c	1½ c	3 c
Advion ® WDG	⅞ Tbsp (½ packet)	1⅘ Tbsp (2 packets)	3¾ Tbsp (4 packets)	7½ Tbsp (8 packets)

Note, some quantities are in teaspoons (tsp) and some are in tablespoons (Tbsp). One tablespoon is equivalent to 3 teaspoons. There are 4 cups (c) in one quart (qt). There are 4 quarts in one gallon (gal).

Only make enough bait for immediate use and do not store excess bait – it spoils quickly. A quart of bait is sufficient to treat 5,000 square feet. For larger areas, use 1-2 gallons per acre based on foliage density.

EQUIPMENT

- A large mixing bowl or bucket large enough to hold 1 ½ times the total volume of bait you intend to mix.



- Measuring cups, and jug

- A device for mixing. We use a cordless drill with a kitchen whisk modified so it can be fitted into the drill chuck. A paint mixer also works well in place of the whisk.

NOTES AND "OPTIONAL" EXTRAS

Be sure to use fresh oil in the mixture. **Don't use rancid oil** because ants will not be attracted to spoilt oil.

We often use **powdered beef liver** in place of peanut butter (use the same amount). This makes the finished bait even more attractive to LFA workers, which means they will bring more bait back into the nest. Powdered beef liver is available from health food stores and also online through E-Bay. If using beef liver, add it to the water before adding xanthan.

Xanthan gum is a thickener used in cooking. It is a very important ingredient that emulsifies (mixes the oil and water together) and also thickens the mixture so it will stick to vegetation.

Health food stores often carry xanthan in stock as a gluten-free food thickener. Xanthan can be very difficult to mix because it clumps very quickly. However, a rapid dispersal version called "xanthan RD" is available online through E-Bay and much easier to mix.

MIXING PROCEDURE:

Combine the pesticide, beef liver powder (if using it) and water in a large mixing bowl or bucket. Start mixing and very slowly add the xanthan gum. It can be difficult to mix the xanthan so be patient and add it very slowly and run the mixer at the highest speed safely possible. If these ingredients are not thoroughly mixed, little lumps can remain which will clog the nozzles of spray equipment. Continue to mix until everything is evenly combined. It should look like a thick sticky whitish goop (mixing stage 1)[4].

Once completely mixed, add the peanut butter and mix thoroughly. Then add the oil. At this point, the oil will sit on top of the water/xanthan mixture (mixing stage 2).

Continue to mix until everything is combined. The bait should now have the same consistency as pudding or ketchup (mixing stage 3).

[4] the mixture will be much darker if using beef liver powder

Some people like to add food coloring so it's easier to see where it has been sprayed (this may stain foliage and driveways etc.). You may choose to pass the gel through a sieve to strain out any clumps (optional). Always wash hands and exposed skin after mixing and before eating, drinking, using the restroom or smoking.

INSTRUCTIONS FOR USE

- If using Tango™, you MUST have the attached "2ee recommendation" from Wellmark International found at the end of this fact sheet. When using Advion WDG®, you must be in possession of the SLN label found at the end of this fact sheet.
- Make sure you have adequate protective clothing. The label lists the following minimum **mandatory** personal protective equipment:
- Long-sleeved shirt and long pants
- Shoes plus socks
- Chemical resistant gloves

When spraying, please consider using chemical resistant headwear, (a cap or hat) and eye protection. Some people also prefer to use a dust mask or similar, but these items are optional.

Do not treat if it is windy because this increases the risk of spray drift and the possibility that bait might be blown back towards you. Work with the wind (even if it is only gentle) so that any possible spray drift will move away from you rather than be blown back towards you. Again, this will minimize the risk of coming into contact with the bait. Make sure that all pets, domestic animals and people are kept away from the area while you are treating. If you operate a business, you may also need to comply with the Worker Protection Standard, (40 CFR Part 170). Plan your treatment in a way that avoids the need to walk over previously treated ground. It's a bit like painting a floor – you don't want to paint yourself into a corner!

The spray bottle will shoot a thin solid stream of gel bait. However, the goal is to apply little globs or splatters of bait evenly over the ground and infested

vegetation. Pressing the spray trigger while waving the spray bottle around normally results in an even pattern of splatters. Trees and vegetation do not need to be soaked. A single squirt up and down the trunk and 2-3 squirts through the smaller branches and leaves is more than enough. Ants foraging through the canopy will find the bait all by themselves, just try to get a nice even splatter throughout the interior of the canopy. Also, do not spray directly on ripening fruits and flowers because that may harm beneficial pollinators like bees. Always wash hands and exposed skin afterwards and before eating, drinking, using the restroom or smoking.

After use, thoroughly clean the spray bottles using a heavy-duty degreaser. Failure to do this will cause the nozzles to gum up and lose their effectiveness. Spray the degreaser through the nozzle, let stand for ten minutes, then rinse well. Make sure all internal components are clean and free of oil residue.

Although it is tempting to help things along by also using other chemical sprays, this does far more harm than good! We need the worker ants to keep on harvesting the gel baits and feeding the other ants in the colony. At this time, they are your friends and are actually helping you to control the problem.

SPRAY EQUIPMENT

The finished bait will have a pudding-like consistency and not every sprayer is suitable for use with this product. However, there are several equipment options available for applying the gel bait and your choice will depend on how much area you need to cover and your budget.

LOW COST OPTION

Good quality water spray bottles are available at most garden exchanges and hardware stores. The very cheap types do not work very well, so choose a high quality one like a 32 oz. **Zep** brand or similar. These better-quality spray bottles can shoot a stream of bait more than 15 feet making it very easy to target ant colonies nesting in trees. Remove the filter at the bottom of the intake tube before using. The filter is too fine to allow the gel into the spray pump. Also, have a wide-mouthed funnel available to fill the spray bottle.

LARGER SPRAYERS

Pesticide sprayers come in many forms, but most can be classified by the method used to expel the baits or pesticides.

Pump-up sprayers use compressed air to drive the bait out of the nozzle. These are usually pressurized by the user pumping air into the spray bottle (like pumping a tire) before use.

We have tested a few of these and most are not very effective. The Redmax HM20 and possibly other good quality sprayers work very well. We replace the sprayer tip with a "D2" spray nozzle for best results. These have an effective spray distance of over 20 feet but require a strong arm to pump.

Lever-type sprayers use an external lever to operate a pump inside the sprayer (but does not pressurize the sprayer itself). The type of pump influences how well these sprayers work with a thick liquid like the HAL gel bait. One pump that seems to be very effective is the Jacto HD400 4-gallon backpack sprayer. This has a piston pump which is more effective at spraying thick liquids. The Jacto sprayers have a spray distance of up to 30 feet. As with the Redmax, you can replace the sprayer tip with a "D2" spray nozzle or cut the spray tip. To learn more, watch our "How to Modify a Jacto HD400" video on our website.

COMMERCIAL SPRAYERS

For very large or commercial applications, the sprayers from R&D Sprayers are the best we have used. R&D make a range of spray equipment powered by liquefied CO2. We adapt these to run with compressed air because its less expensive, but that requires a degree of modification. When set up correctly, R&D sprayers have an effective spray range of over 40 feet. These spray units are expensive and not really suitable for home use.

A NOTE OF CAUTION

There are a number of home-made devices being used and some of these use old propane tanks or other items to spray bait from a pressurized tank. We **DO NOT** recommend these because there are too many risk factors involved for them to be safe. First, propane tanks are not designed for high pressure applications and are not tested or rated for this purpose. Most tanks are old and are "out of test" which means they are even less safe. Having a pressurized tank of pesticide explode is not much fun.

EQUIPMENT SUPPLIERS

Zep® Spray bottle

Available at hardware or garden stores. We found that **Zep®** brand bottles work very well but the budget priced bottles were ineffective

Redmax sprayer

Doc Stanleys
(808) 961-6039
1133 Manono St Hilo

Jacto Sprayer

Nutrien
(808) 935-7191 888 Kalanianaole St Hilo, HI 96720

Garden Exchange
(808) 961-2875
300 Keawe Street. Hilo, HI 96720

Steve's Honda
(808) 969-3030
800 Leilani St #B, Hilo, HI 96720

D2 nozzle

Available from Pesticide supply stores like Garden Exchange

Tango® concentrate Pesticide
Available in 1 pint or 2.5 gallon from

Farm Supply Cooperative Inc. Hilo
(808) 969-7474
60 Holomua Street, Hilo, HI 96720

Garden Exchange
(808) 961-2875
300 Keawe Street. Hilo, HI 96720

Hilo Grow Shop
(808) 961-2875
300 Keawe Street. Hilo, HI 96720

Nutrien
(808) 935-7191
888 Kalanianaole St Hilo, HI 96720

Farm and Garden in Kona
(808) 329-4775
73-5582 Olowalu St Kailua-Kona, HI 96740

Simplot
(808) 326-7555
73-4095 Hulikoa Dr Kona, HI 96740

Advion® WDG Pesticide

Garden Exchange
(808) 961-2875
300 Keawe Street. Hilo, HI 96720

Nutrien
(808) 935-7191
888 Kalanianaole St Hilo, HI 96720

Simplot
(808) 326-7555
73-4095 Hulikoa Dr Kona, HI 96740

Farm and Garden in Kona
(808) 329-4775
73-5582 Olowalu St Kona, HI 96740

Xanthan gum
Available from most health food stores or online. Xanthan gum is a thickener used in cooking

Corn oil
Available from any supermarket. Corn oil appears to be the most attractive but any vegetable cooking oil will work also. **Don't use rancid oil**

Powdered Beef Liver
Available at health food stores or online

TANGO

2(ee) Recommendation

For the Control of Little Fire Ants in vineyards, row crops, bearing and on-bearing fruit trees, citrus and nut groves or other crop and non-crop areas

For Distribution and Use Only Within the State of Hawaii

EPA Reg. No. 2724-420

Directions For Use

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

FIFRA Section 2(ee) permits "applying a pesticide to a target pest not specified on the label if it is to a site on the label." and "Employing any method of Application not prohibited by labeling". The following is a Wellmark International authorized 2(ee) recommendation.

This recommendation is made as permitted by Section 2(ee) of FIFRA, as amended, and has not been submitted to or approved by EPA.

Important

Before using this product, read and carefully observe all applicable directions, restrictions, and precautionary statements on the EPA-registered container label.

Rates and Timing

Little Fire Ant:

Bait Preparation – Thoroughly mix TANGO™ with the appropriate bait matrix to achieve a final concentration of 0.25% S-methoprene.

Apply bait at sights of ant activity with appropriate application equipment. Bait may be applied in arboreal situations to trees, shrubs, and other plant material to control nesting ants. It is important to present and maintain a sufficient quantity of bait to obtain control of ant populations. Monitoring the area for ant activity can help to determine the optimal location for bait placement. Following bait placement, monitor for ant activity and replenish bait mixture as needed. Bait stations are not required as they may hinder bait acceptance.

THIS 2(EE) RECOMMENDATION MUST BE IN THE POSSESSION OF THE USER AT THE TIME OF PESTICIDE APPLICATION.

Registrant: **WELLMARK INTERNATIONAL**
Schaumburg, IL 60173
March, 2012

syngenta.

FIFRA

Section 24(c) Special Local Need Label

FOR DISTRIBUTION AND USE ONLY WITHIN THE STATE OF HAWAII

Advion® WDG
For Control of Little Fire Ant (LFA) (*Wasmannia auropunctata*) In and Around Residential, Recreational, Natural and Commercial Landscapes, Golf Courses, and Other Non-crop Areas (Including Non-bearing Fruit and Nut Trees and Vines Grown in the Listed Use Sites)

EPA Reg. No. 100-1501
EPA SLN No. HI-210003

This label is valid until October 20, 2026 unless otherwise amended, withdrawn, cancelled, or suspended.

DIRECTIONS FOR USE

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
- This label must be in the possession of the user at the time of application.
- Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the EPA-registered label.
- Do not use in areas that may affect Threatened or Endangered species or critical habitat.

Mixing Instructions
Prepare a gel matrix spray mixture consisting of water, vegetable oil, xanthan gum and a protein based product as listed in Table 1.

- Determine the volume of the Gel Matrix Spray Solution required to apply to the intended area (see Table 1) and prepare only the amount required for application to that area.
- Mix Advion WDG and xanthan gum into water.
- Add the oil and protein based product into the spray mixture.
- Mix thoroughly creating the bait matrix gel spray solution.

Do not use household utensils to measure, mix, or apply Advion WDG.

Table 1. Gel Matrix Spray Solution Components and Quantities to Prepare Advion WDG for Application to Control Little Fire Ants

Ingredients	Percent (by weight)	54 oz Gel Matrix Spray Solution w/w	Fluid oz Gel Matrix Spray Solution Measures w/v
Advion WDG (one foil packet)	0.6	0.33	0.509
Water*	62.9	33.80	31.378
Vegetable Oil*	32.9	17.90	17.432
Xanthan	0.6	0.37	0.581
Protein*[1]	3.0	1.60	2.833
Total	**100.0**	**54.00**	**52.733**

[1]Examples of protein sources can include but are not limited to smooth peanut butter, powdered liver, brewer's yeast, and torula yeast.
*Slight variations in proportions are allowable.

All ingredients are measured by weight.

Application Instructions
Apply the gel matrix spray solution to plant foliage, trunk and base of plants where ants are actively foraging. Apply with a backpack, garden sprayer or spray bottle with the in-line screens removed. This application attracts ants to Advion WDG.

- Recommended application rate: 1-2 gallons of spray solution per acre depending on vegetation density.
- Do not apply more than 18 lb (2 gallons) of mixture per acre.
- For application to desirable plants, a small number should be treated and observed for phytotoxicity for at least one week before making application to the entire planting.
- Do not apply more than 2.4 oz (equal to 0.03 lb ai) of Advion WDG per acre in a single application to a treated area.
- Do not apply more than 8 applications per year to the same treated area.
- Do not apply more than 19.2 oz (equal to 0.24 lb ai) of Advion WDG per acre per year to a treated area.
- Do not re-apply within 6 weeks from the previous application if ants are still present.
- When applying to the base of plants, do not apply to the soil.
- Do not apply to any plants which are grown to provide harvestable food (fruits, vegetables, nuts, roots, tubers, etc.).

Information on LFA may be obtained from local Hawaii Cooperative Extension Service offices or the Hawaii Ant Lab.

Cleaning and Disposal
After use, thoroughly clean the spray bottles using a heavy-duty degreaser. Failure to do this will cause the nozzles to gum up and lose their effectiveness. Spray the degreaser through the nozzle, let stand for ten minutes, then rinse well.

Issue Date: October 21, 2021
Expiration Date: October 20, 2026

24(c) Registrant:
Syngenta Crop Protection, LLC
P. O. Box 18300
Greensboro, NC 27419-8300

Label Code: HI1501014AA0721

APPENDIX 3. TARGET SPECIES BIOLOGY

LITTLE FIRE ANTS

Scientific name:

The scientific name for this species is *Wasmannia auropunctata*. Around the world it is also known as the "cocoa tree ant" and the "electric ant".

Origins:

Little Fire Ants (LFA) are originally from south America, east of the Andes. It has been spreading around the world for over 100 years.

Known distribution:

USA (Florida), Caribbean islands, west Africa, Israel, Papua New Guinea, Solomon Islands, New Caledonia, French Polynesia, Hawai`i (Big Island and Kaua`i), Australia, Galapagos, Guam.

On the island of Hawai`i, it is common and widespread from Kalapana to Laupahoehoe up to an elevation of 2000 ft and sparsely distributed in Kailua-Kona on the west coast. A small population has been found near Kailihiwai Bay. Over 20 infestations have been detected on Maui, which are either under active treatment of have been eradicated. On O`ahu, there have been 69 infestations detected since 2014, 10 of which are in nurseries. Only about half of these are under active management or have been eradicated. On Kaua`i, there have been 10 detections, most of which are either under active management or have been eradicated.

Biology:

Little Fire Ants are a rainforest species, and nest on the ground, in leaf litter and in vegetation. They have many small inter-connected nests rather than one main colony. Instead of a single queen, Little Fire Ant colonies have many queens – each laying eggs. This results in a virtual blanket of nests reaching from the ground to the canopy. They prefer sites that are shaded, warm and moist, and generally avoid full sunlight.

Nurseries and potted plants (especially under shade) are a perfect habitat for this species. Each potted plant can contain one or more nests in the potting medium, under the pot and in the plant being grown. Often nursery benches are supported by cinder blocks and the gaps between these blocks also host other colonies. Each potted plant, when moved, can start a new infestation at its destination.

The predominant sources of food for this species are the sugars produced by scales, mealybugs and other sap-sucking hemipterans (previously homoptera) like whiteflies and aphids. Little Fire Ants "ranch" these plant pests, moving them to new locations and protecting them from their natural enemies.

Impacts:

The association between Little Fire Ants and sap-sucking hemipteran plant pests can cause damage to the hostplants and reduce productivity of fruiting trees and reduced growth of ornamental plants. Additionally, Little Fire Ants have a painful sting, and infested sites often have many millions of these ants per acre. Ants foraging on vegetation often fall to the ground and on people or pets. It is common for people in infested areas to suffer repeated stings on the neck, shoulders and torso. Domestic pets can be blinded by repeated stings on their eyes. Once Little Fire Ants become well established in a new location, they will invade homes in search of food and new nesting sites. In these situations, people are often stung in their beds and children often become victims. By this stage of development, it is almost impossible to eradicate them and residents are forced into a continuing cycle of repeated applications of baits and pesticides. Some people choose to move to uninfested locations in order to avoid this problem.

WHITE-FOOTED ANTS

Scientific name:

The scientific name for the White Footed Ant is *Technomyrmex dificilis*. This ant was previously identified as *Technomyrmex albipes* until 2007. It is also known as the "Black House" ant around the world.

Origins:

Native to Southeast Asia, White Footed Ants have spread throughout the world mainly through the transport of cargo and other commodities.

Known distribution:

USA (Florida, South Carolina, Georgia, Louisiana, Hawai`i), Antigua, Nevis, Puerto Rico, St. Croix and St. Thomas. In Hawai`i WFA is currently known from Maui, O`ahu and Kahoolawe. This species is a part of group of *Technomyrmex* species that look almost identical to one another, so it is probable this species may be established on other Hawai`ian Islands.

Biology:

White Footed Ants (WFA) will nest in almost any location inside and outside of the house including under roofs, cardboard boxes, compost piles, potted plants, outdoor furniture, etc... but trees seem to be ideal. Colony sizes can range from 400,000 to 3 million individuals. Because of the enormous size of the colonies, large amounts of food are essential to sustain the populations. WFA will feed on a wide variety of food sources including sugary substances and dead insects.

Unlike many other ant species, WFA do not share food with the rest of the colony. This makes control with baits very difficult because only about half of the colony will be killed (those ants that foraged on and ate the bait). The sterile female worker ants lay unfertilized eggs ("trophic eggs") which are used as a food source for the non-foraging ants in the colony.

Like other "tramp ant" species, WFA spread rapidly through movement of infested material such as household waste, plant material, potted plants, etc. They have enormous reproductive capabilities and new colonies within an area are founded via swarming as well as budding (a subsection of the colony moves to a new location with a queen to begin a new colony).

Impacts:

White Footed Ants (WFA) do not bite or sting. They are considered a pest primarily due to their sheer numbers, which can seem never ending. WFA are also known to tend hemipteran plant pests such as scale insects, aphids and mealy bugs and feeding on the sweet sugary honeydew produced by these insects. It has been documented that this association has contributed to the spread of several serious plant diseases around the world. Because WFA are very attracted to sweets they are considered a major nuisance in homes, gardens, greenhouses, and orchards.

ARGENTINE ANTS

Scientific name:

The scientific name for Argentine Ants is *Linepithema humile*. Until about 20 years ago it was known as *Iridomyrmex humilis.* Worldwide it is known as the Argentine Ant.

Origins:

As its name suggests, this species was originally from south America with its native range centered on the Paraná river catchment which spans Brazil, Paraguay and Argentina.

Known distribution:

Argentine ants have been widely distributed by human commerce during the early part of the 20th century and are now found worldwide, including Europe, USA, South America, Australia, Africa and Asia as well as many islands in the Pacific.

It is a common species on all the islands of Hawai`i and is usually found at mid-high elevations. At lower elevations, it is out-competed by Big-Headed Ants.

Biology:

This species prefers a Mediterranean climate with warm dry summers and cool wet winters. However, in the absence of competition from other ant species, it can establish and thrive in warmer and cooler climates.

Impacts:

Argentine ants are a serious ecological pest, disrupting native ecosystems and is also a structural pest – often invading homes and urban buildings.

SINGAPORE ANTS

Scientific name:

The scientific name for the Singapore Ant is *Monomorium destructor*. It is also commonly known as the "destructive trailing ant" and "mizo-hime-ari" (Japan) around the world.

Origins:

Singapore Ants are native to India, Japan, Malaysia and Sri Lanka and are easily spread around the world through commerce and trade.

Known distribution:

Australasia-Pacific, North America, South America, Africa, Laysan, French Frigate Shoals, Hawai`i. In Hawai`i it is currently known to be established on Hawai`i, Kaua`i and O`ahu

Biology:

Singapore Ant will nest in a variety of places but appear to be unable to establish themselves in undisturbed habitats such as forested areas. They are often found in urban areas as well as irrigated gardens, orchards, and rural areas. Singapore Ants spread quickly over long distances through human transportation of infested materials but will spread short distances through budding.

They forage on a variety of food sources from dead and live insects to sugary honeydew from plant sucking insects and nectar.

Impacts:

Singapore Ants are more of a pest in urban environments and as a house pest. Although they will forage on sugars and proteins the biggest problem is the destruction of electrical and phone lines. "Foragers gnaw holes in fabric and rubber goods, remove rubber insulation from electric and phone lines, and damage polyethylene cable" (Global Invasive Species Database). They can destroy or damage electrical lines in houses and cars which can lead to electrical fires.

BIG-HEADED ANTS

Scientific name:

The scientific name for the Big-Headed Ant is Pheidole megacephala. It is also known as the "brown house-ant", "coastal brown-ant", "lion ant", and "Großköpfige Ameisen" (German) in other parts of the world.

Origins:

The Big-Headed Ant is believed to be native to southern Africa.

Known distribution:

It is widely distributed throughout the temperate sub-tropical and tropical regions of the world.

Biology:

Big Headed Ants get their name from the "major caste" of worker ants (often called soldiers) which have extremely large heads compared to the rest of their bodies. The smaller "minor caste" (small foraging ants) will forage on almost anything from sweet sugary liquids, dead insects, and plant seeds. They bring the food back to the nest where it is shared throughout the colony.

Colonies generally have multiple queens which can lay hundreds of eggs each day. The transportation of infested materials is known to distribute BHA over long distances, but they can also spread locally via budding and swarming depending on the climate.

The Big-Headed Ant (BHA) can establish its self practically anywhere. Colonies may be found in agricultural areas, coastal areas, forest (natural and planted), wetlands, range/pastures, as well as urban/residential areas.

Impacts:

In rural areas, BHA are known to displace much of the native fauna through aggression and competition. They can directly impact crops through seed harvesting and indirectly by harboring plant sucking insects. BHA have also been known to chew through irrigation lines. They are a major pest of pineapples where they tend pineapple mealy-bug.

In urban/residential areas they often cause considerable damage to telephone and electrical lines in homes and buildings.

PENNANT ANTS

Scientific name:

The scientific name for the Pennant Ant is *Tetramorium bicarinatum*. It is also known as the "Bicolored Pennant Ant", "Guinea Ant", or "Penny Ant". The name Guinea Ant is also commonly used for a close relative

Origins:

The Pennant Ant is native to the Indo-Pacific region of the world.

Known distribution:

This is a cosmopolitan species commonly found around the world and is one of the most widespread species of ants globally. In Hawai`i it is most likely established on all of the major islands.

Biology:

Colonies of Pennant Ants are usually small to moderate in size and occur in urban environments, yards, gardens, green/shade houses. Nests can have multiple queens and workers can vary in color and size. It is believed that inseminated queens can found new colonies without the aid of worker ants. Pennant Ants are generalists in their diet and will feed on almost anything.

Impacts:

Although they are not considered to be a major pest, they can be a nuisance around the home and garden because of their ability to sting if provoked.

APPENDIX 4. LINKS AND CONTACTS

Hawai`i Island

Hawai`i Ant Lab (HILO)
875 Komohana St, Hilo, HI 96720 Hilo, HI 96720
Ph: (808) 315 5656
www.littlefireants.com

Hawai`i Ant Lab (KAINALIU)
79-7381 Mamalahoa Highway
Kealakekua, HI, 96750
PH: 808-209-9014
info@littlefireants.com

Hawai`i Department of Agriculture
16 E. Lanikaula St
Hilo, HI 96720
808-643-PEST (7378)

Big Island Association of Nurserymen
P.O. Box 4365, Hilo, HI 96720
Web page http://Hawai`i plants.com

Hawai`i Export Nursery Association
P.O. Box 11120, Hilo, HI 96721
Ph: (808) 969-2088
Web page http://www.hena.org/

CTAHR Research Extension Center
875 Komohana St, Hilo, HI 96720
Ph: (808) 981 5199
Web page **Error! Hyperlink reference not valid.**

Maui Nui

Maui Invasive Species Committee
1000 Holomua Rd,
Makawao, HI 96768
808-573-6472
https://mauiinvasive.org/

Hawai`i Department of Agriculture
635 Mua Street
Kahului, HI 96732
808-643-PEST (7378)

O`ahu

Hawai`i Ant Lab
41-698 Ahiki St,
Waimanalo, HI 96795

O`ahu Invasive Species Committee
743 Ulukahiki St
Kailua, HI 96734
808-266-7994
https://www.oahuisc.org/

Hawai`i Department of Agriculture
1428 S. King St
Honolulu, HI 96814
808-643-PEST (7378)

Kaua`i

Kaua`i Invasive Species Committee
7370K Kuamo`o Rd,
Kapa`a. Hawai`i 96746
808-821-1490
https://www.kauaiisc.org/

Hawai`i Department of Agriculture
Plant Pest Control
4398 Pua Loke St # A,
Lihue, HI 96766
808-643-PEST (7378)

Search for product MSDS
http://www.cdms.net/LabelsMsds/LMDefault.aspx

Pesticide toxicology information
http://extoxnet.orst.edu/ghindex.html

USDS Animal and Plant Health Inspection Service (APHIS)
http://www.aphis.usda.gov/

Pesticide Information
http://state.ceris.purdue.edu/doc/hi/statehi.html