

PROJECT REPORT

to

Hawai`i Invasive Species Council

from

UNIVERSITY OF HAWAII

Office of Research Services
2440 Campus Road, Box 368
Honolulu, HI 96822

**Pacific Cooperative Studies Unit
University of Hawai`i at Mānoa**

Hawai`i Ant Lab Statewide funding 2018

Summary

The Hawai`i Ant Lab (HAL) is a collaborative project between the Pacific Cooperative Studies Unit (PCSU) and the Hawai`i Invasive Species Council (HISC)¹. The Hawai`i Department of Agriculture also provides partial funding for HAL as well as infrastructure support to the unit. This contract is for the provision of core funds that will allow the Hawai`i Ant Lab to provide ongoing support to the HISC and to the University of Hawai`i. and maintains a “critical mass” needed to provide these support services. This report relates to PCSU account 4503483 (Hawai`i Ant Lab core funding).

The HAL is a point-of-contact for conservation agencies, industry and members of the public on any matter involving identification and control of invasive ants. The HAL is developing a regional and global reputation as a center of excellence and cutting-edge research on biosecurity, pest ant management and ant taxonomy. Daily services provided by the Hawai`i Ant Lab include the following:

- Operates and maintains a 24/7 telephone contact service for members of the public.
- Provides a diagnostic service to members of the public and other conservation agencies.
- Develop, update and promote the www.littlefireants.com website
- Manages the HAL web-based discussion group.
- Produces “fact sheets” providing practical advice to residents and industry.
- Provides ongoing advice, expertise and assistance to island invasive species committees as needed.
- Regular speaking engagements to associations and societies, public displays.
- Conduct monthly training days for residents and industry groups.
- Provides training in identification, awareness and control practices to other agencies such as island ISCs, Hawai`i Department of Agriculture and DLNR.
- Manages new detections of LFA on neighbor islands, develops and implements eradication plans for these.
- Prevent and mitigate infestations that threaten public safety or act as vectors for inter- and intra- island spread of invasive ants.

¹ *The Hawai`i Department of Agriculture also provides partial funding for HAL as well as infrastructure support to the unit*

General metrics

A total of 8,283 persons interacted in some way with staff from Hawai'i Ant Lab in 2018 (Table 1). Attendance at ant management clinics was lower than expected and this may be due to cooler weather and heavier rain throughout 2018.

Table 1. General metrics for Hawai'i Ant Lab in 2018.

		Q1	Q2	Q3	Q4	
	Target	1 Jan to 31 Mar	1 Apr to 30 June	1 July to 30 Sept	1 Oct to 31 Dec	2018 Totals
public calls and emails	700	118	146	321	218	803
public walk-ins and mail	total	35	75	73	71	254
public ant samples	300	154	173	268	321	916
website visits	5000	751	925	1,039	1,053	3,767
interaction at presentations	1500	468	1011	522	287	2,288
participants at ant management clinic and other trainings	200	108	104	34	9	255
2018 Totals	7,700	1,526	2,330	2,223	1,950	8,283

Prevention activities

The risk of inter-island spread has become a front-line issue in recent times with the discovery of new LFA incursions on Oahu and new detections on Maui. HAL addressed these threats by:

- Increasing the frequency of point-of-entry surveys at airports and seaports on the Big Island.
- Applied bait treatments at infested seaports and airports. This particularly applies to Hilo passenger terminal where a large portion of the car parking area is infested.
- Continue to engage with the nursery industry, pesticide retailers, small-scale plant vendors and consumers.

The intra-island spread of LFA on Hawai'i Island is also a major concern. While this spread can not be prevented, HAL has worked reduce the rate of spread. Strategies to achieve this include:

- Developing risk minimization procedures for county of Hawai'i green waste facilities and monthly monitoring of pest status at the facilities.
- Monitor, and where necessary, treat infested areas where these pose an increased risk of further spread.
- Educate industry and the public on invasion pathways and preventing movement of LFA.
- Providing training and education on the most effective control methods.

Achievements in 2018

Point of entry surveys and bait treatments

Frequency of point of entry surveys is determined by risk and previous survey results. Sites with known LFA populations are surveyed every 3 months and those without are surveyed every 6 months. When LFA are detected, the site is treated on a regular basis. Table 2 below outlines the number of surveys and treatments applied at points of entry for Hawai'i island.

County of Hawai'i green-waste processing

HAL has worked with the County of Hawai'i to modify the processing of green waste at the Hilo and Kona facilities. The new process includes partial composting of waste which raises temperatures to over 130 F. over three days. This destroys invasive species including ants, Coconut Rhinoceros Beetles, vectors for Rapid Ohia Death, and possibly Rat Lungworm Disease. HAL monitors both facilities on a 1-2 month basis for LFA and reports these surveys on the website (Table 2). Together, the new practices and monitoring activities have substantially reduced the contamination risks associated with county mulch.

Table 2. summary of surveys and treatment of points of entry on Hawai'i island.

Location	target	1 Jan to 30 June 2018	1 July to 31 Dec 2018	Total 2018
Surveys				
Hilo Airport (ITO)	4	2	2	4
Hilo Seaport (HSP)	4	1	2	3
Kawaihae Seaport (KSP)	2	1	1	2
Kona Airport (KOA)	4	2	2	4
Hilo green-waste	12	3	6	9
Kona green-waste	12	4	5	9
	38	13	18	31
Treatments				
Kona Airport (KOA)	As needed	-	-	-
Kawaihae Seaport	As needed	-	3	3
Hilo Seaport (HSP)	As needed	1	-	1
Hilo airport (ITO)	As needed	1	-	1
Total vials deployed				
	vials			
Hilo Airport (ITO)	1,917			
Hilo Seaport (HSP)	864			
Kawaihae Seaport (KSP)	350			
Kona Airport (KOA)	1,118			
Hilo green-waste	865			
Kona green-waste	942			
total	6,056			

Response activities

LFA Oahu

Over the past two years, HAL has collaborated with HDOA to implement the eradication program for infested sites at Waimanalo and Mililani Mauka. The treatment phase has been completed and no ants have been detected at either site since mid-2016. Ongoing monitoring is necessary to ensure no colonies remain. New LFA outbreaks continue to be discovered (Figure 1), mostly in the Waimanalo area where many larger nurseries operate and in residential parts of Kaneohe. As new infestations are detected, treatment and follow-up monitoring are implemented until no LFA are detected. These sites are also flagged for additional survey activities.



Figure 1. Location of current infested locations on Oahu (2018).

LFA Maui

There are several established LFA populations on Maui (Figure 2). One site, located at Waihe`e is a small remnant outbreak of an infestation treated in 2009-2010. Follow-up monitoring revealed a small infested area beyond the original treatment boundary. This may have been an undetected colony or more likely, a result of within-property movement of risk materials such as green waste.

A second infestation, located at Huelo spans approximately six acres. This site has been treated throughout 2015 and 2016. However, one resident actively resisted the treatment program which delayed treatment activities. This delay resulted in a rebound of LFA population density at this site which required the treatment program to be extended, including not allowing access to the property. These actions have severely compromised progress at this site. Treatment of adjoining properties will continue where possible.

Containment activities at a large >20 acre infestation at Nahiku have continued. This site is bisected by several streams and some parts of this site are not accessible on foot. Efforts to delimit this infestation are needed to identify infestation boundaries. A Special Local Need permit (HI-SLN180001) has been sought and granted to

allow this site to be treated by aerial means. This permit will allow treatment of previously inaccessible parts of this infestation with Altosid (a methoprene concentrate).

A new infestation was recently discovered at Kapalua. Spanning approximately ten acres, this site has been treated 8 times and LFA are now restricted to two small “hotspots” where treatments continue. These hotspots, are invariably associated with larger trees where bait can not be applied effectively into the crowns. This results in canopy colonies not receiving adequate bait amounts and necessitates additional treatment and monitoring activities.

Additional outbreaks have recently been detected by surveys conducted by the Maui Invasive Species Committee. HAL works with MISC in providing guidance and treatment applications as required.

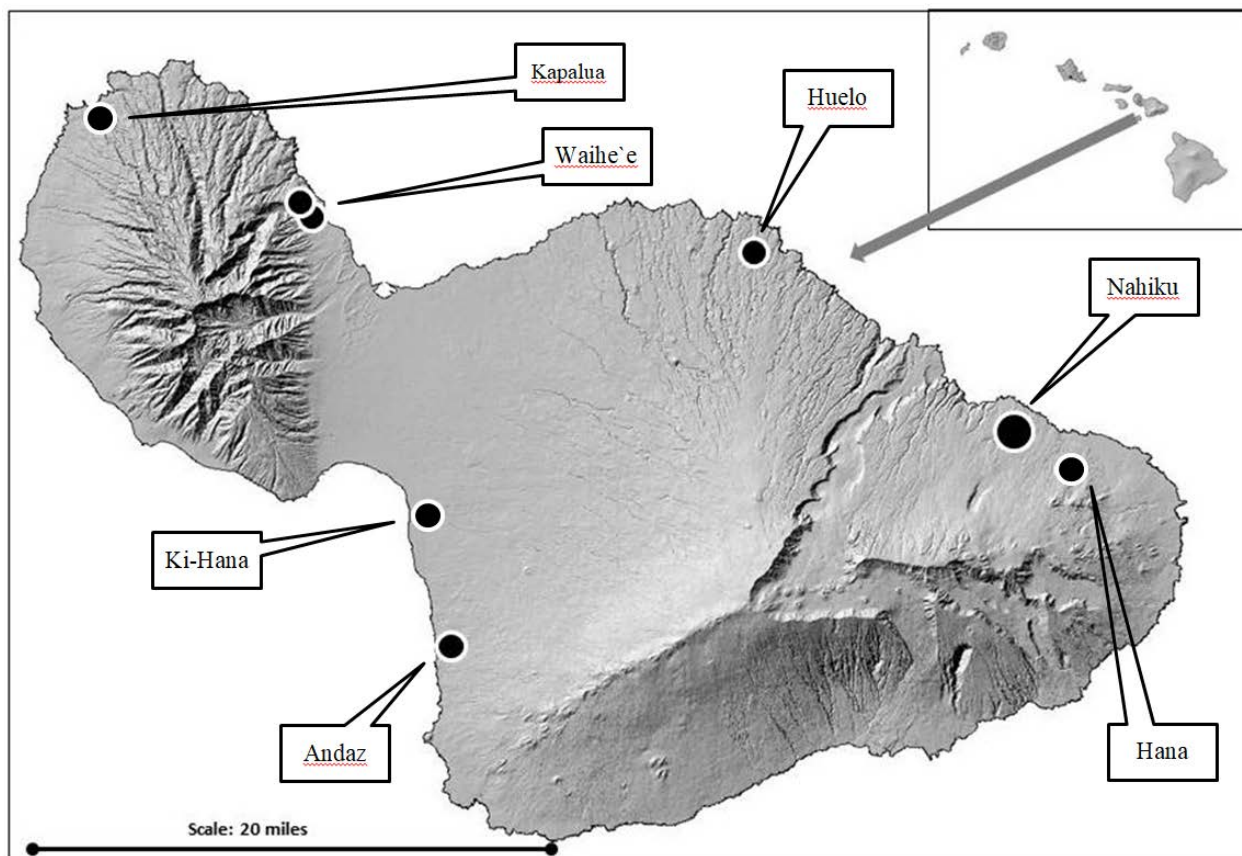


Figure 2. Map of Maui showing the location of infested sites (2017)

Extension activities

Ant management workshops and clinics

The inaugural ant management clinic was delivered to 20 export nursery operators in June 2013. Since that time, similar ant clinics have been delivered to residents and small-scale nursery managers on a monthly basis. The workshop covers every aspect of invasive ant management from ant biology, bait design, practical sessions on pesticide safety, bait mixing and application. These clinics have steadily increased in popularity and it has become apparent that additional workshops need to be scheduled. Feedback from previous clinics has been overwhelmingly positive. In 2018, a total of ten clinics were conducted for a total of 110 participants.

Presentations to industry and interest groups

Hawai'i Ant Lab staff continue to deliver presentations to industry groups, clubs, associations, teachers and other interested groups. Extension activities during the reporting period included staffed static displays, presentations to groups and training sessions which reached 2,288 members of the public at 56 separate events. The table below summarizes extension activities for 2018.

Table 4: list of HAL presentations, training events and static displays for the reporting period.

Date	Group	# people
1/18/2018	DHHL	7
1/22/2018	MISC	17
1/25/2018	MISC	19
1/26/2018	MISC	12
1/29/2018	AMC	12
1/31/2018	Puuhonua	3
1/31/2018	Holualoa Town Hall	40
2/7/2018	East Hawai'i Master Gardeners	30
2/5 and 2/6/2018	Kamehameha Schools	120
2/13/2018	Keaau Town Hall	25
2/21/2018	Keaukaha	30
3/1/2018	Captain Cook Town Hall	50
3/2/2018	Kona Orchid Society	50
3/13/2018	Lions Club	20
3/23/2018	AMC	15
3/31/2018	Honalo Community Presentation	18
4/3/2018	Laupahoehoe School	4
4/14/2018	Cacao Festival	100
4/18/2018	Kaloko NPS	20
4/20/2018	UHH Earth Day	500
4/20 and 4/21/2018	BIAN	100
4/24/2018	Keaukaha Elementary	40
4/27/2018	AMC	16
4/29/2018	Wakefield Neighborhood - Kona	15
5/1/2018	Lei Day	60
5/4/2018	HDOA Oahu	16
5/6/2018	Hamakua Harvest	12
5/11 and 5/12/2018	Kona Orchid Show	50

5/18/2018	AMC	13
5/25/2018	Honokaa Western Week	20
6/16/2018	Malasada shuffle	25
6/29/2018	AMC	20
7/17/2018	Honokaa Business Meeting	30
7/26 and 27/2018	MIDPAC	70
8/3/2018	SSFM at HVNP	3
8/3/2018	Honokaa First Friday	10
8/11/2018	Farm Supply Coop Event	35
8/14/2018	Daifukuji Soto Mission	30
8/16/2018	Third Thursday Thrive	5
8/31 and 9/1/2018	BIAN	80
9/20/2018	AMC	11
9/20/2018	Mauna Kea Speaker Night	65
9/21 to 9/23/2018	HTFG Conference	80
9/27/2018	Ace Pahoa Staff Meeting	12
9/28/2018	AMC	23
9/29/2018	Ace Keeau	20
9/29/2018	Taste of the Hawaiian Range	40
9/30/2018	Hamakua Harvest	8
10/8/2018	Kau Coffee Mill site visit	3
10/9/2018	Big Island Bee Association meeting	18
10/10 and 10/11/2018	LICH Conference	100
10/17/2018	Waimea Rotary	10
10/19/2018	Kona Farm site visit	4
10/20/2018	Purpose Pumpkin Party	50
11/8/2018	Puna Farm site visit	2
11/17/2018	Kona Coffee Cultural Festival	100

Research activities

Screening tests for certified organic alternatives

Three concentrations (low, medium, and high) each of Neem Oil and Spinosad in the HAL gel bait were tested against a negative control in the field for attractiveness and palatability to Little Fire Ants. The sources of neem oil and spinosad were Southern Ag® Triple Action Neem Oil (70% a.i.) and Entrust® SC (22.5% a.i.) respectively. Results from the field palatability trials were used to identify concentrations with the most potential for further testing in laboratory efficacy trials. Results indicated the high concentration of neem oil was not significantly different from the medium and control concentration (Figure 3a) and that the medium and high concentrations of spinosad also were not significantly different (Figure 3b) in the mean number of ants that recruited to the bait stations. Based on our results, the high concentration of neem oil (0.15% a.i.) and the medium concentration of spinosad (0.015% a.i., industry standard) were selected for further efficacy testing.

Although spinosad bait was equally attractive to foraging LFA (Figure 4), mortality was lower (Figure 5). However, this lower mortality may be acceptable to organic farmers with few alternative control options.

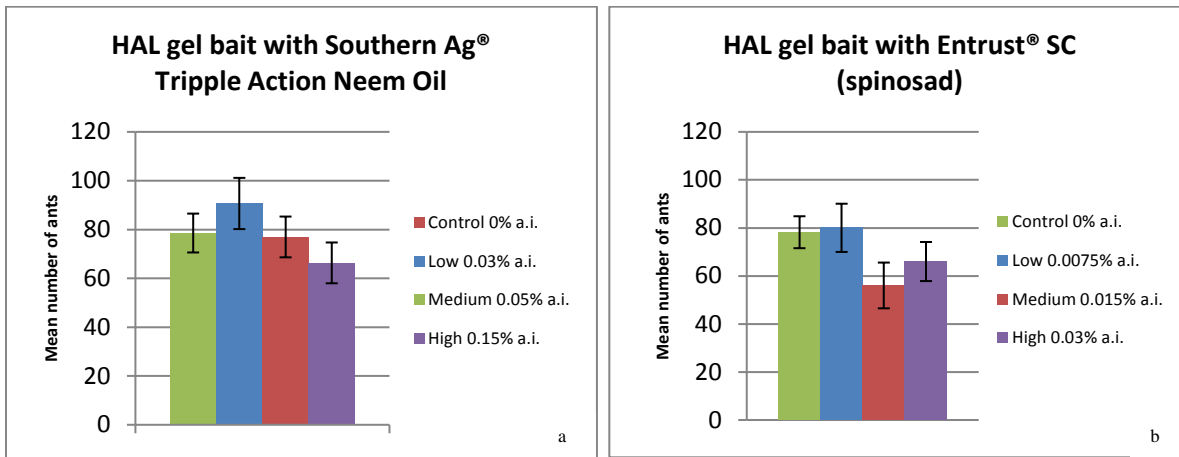


Figure 3: Field palatability of varying concentrations of of neem oil (a) and spinosad (b) in the Hawaii Ant Lab gel bait.

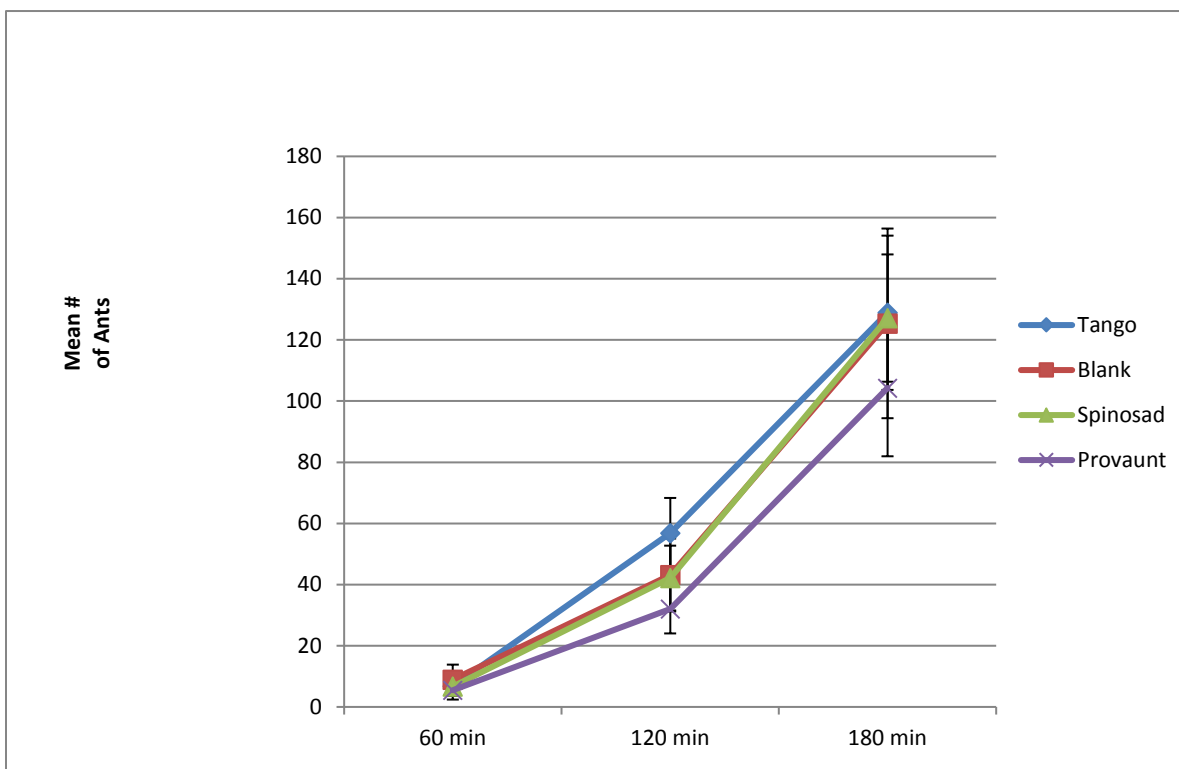


Figure 4. Attractiveness of Spinosad baits was similar to non-organic alternatives.

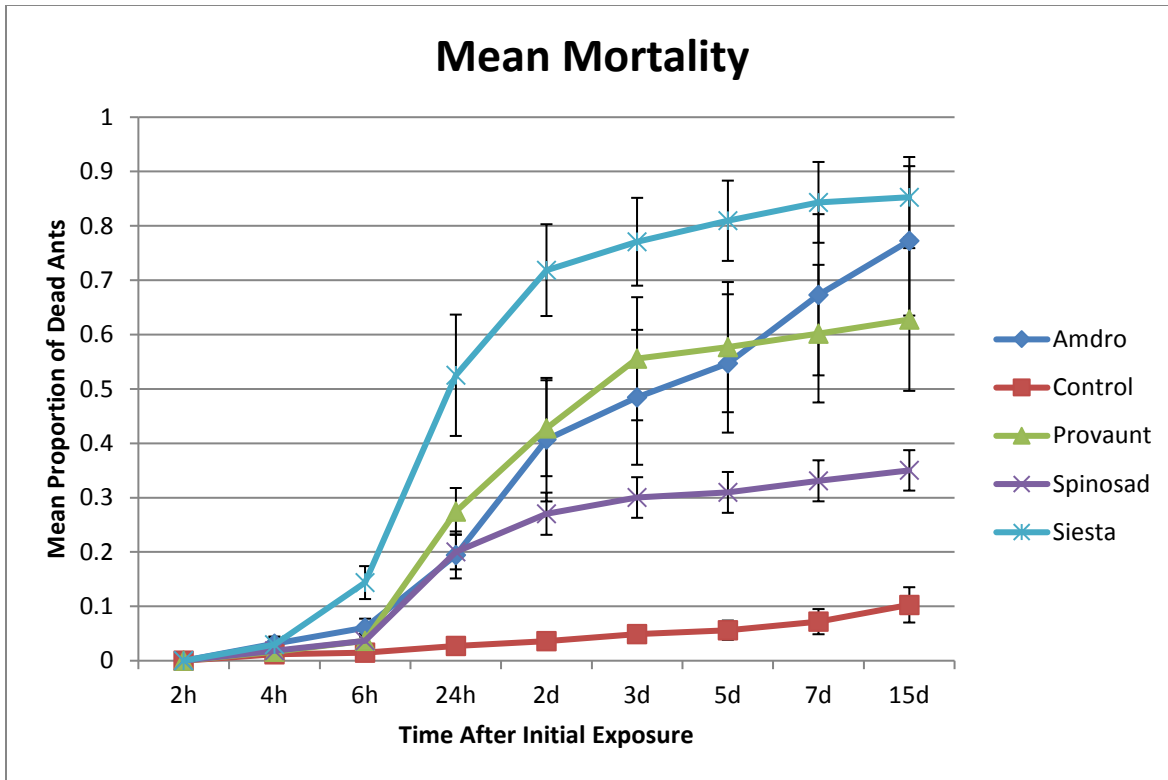


Figure 5. Mortality of Spinosad baits was lower than for non-organic alternatives.

Label extension for Siesta™ ant bait

Commercial fruit growers have few viable alternatives for field control of LFA. Currently Tango™ (a.i. methoprene) is the only option. However, Tango is slow-acting and commercial growers need products that will provide more rapid results. Siesta™ and Altrevin™ are both ant baits that contain metaflumizone, and these products have proven efficacy against LFA. HAL is conducting further efficacy trials in cropping situations in order to allow the registrant of these baits to extend the label use-pattern to include tropical fruits and coffee. Final results indicated Siesta™ Insecticide Fire Ant Bait is effective at rapidly reducing the number of LFA in treated plots and reduced the population at a faster rate over time when compared to the HAL gel bait with Tango (Figure 6). The final report for the Siesta® Efficacy trials was written and submitted to BASF Corporation for review.

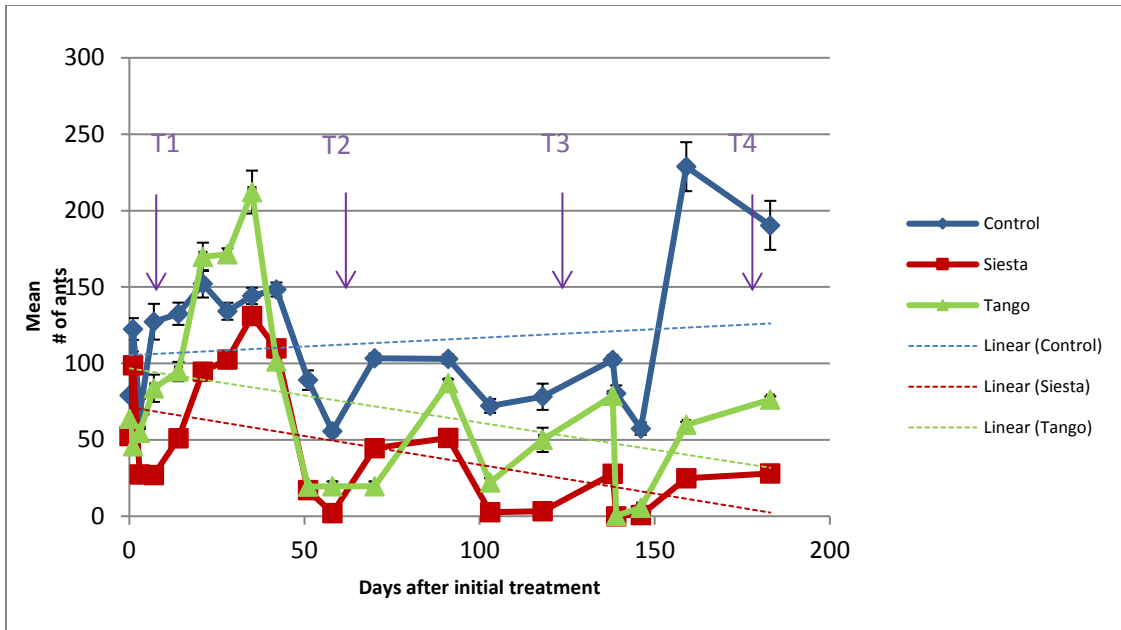


Figure 6: Ant abundance in response to treatment with Siesta™ and Tango™ compared with control in field trial.

Dietary Study

The final revised draft of the LFA laboratory diet study was completed and submitted to Florida Entomologist for publication.

Marking Study

Data was analyzed from the LFA topical protein marking experiment conducted the year prior. Data is in the process of being written up for publication. This study will aid in setting protocols for mark-recapture studies on ants in Hawaii and is a precursor to other marking studies intended to aid in assessing potential efficacy of bait stations for LFA control other behavioral studies.

Regional involvement

Hawai`i is part of the greater Pacific region and shares many invasive species issues with other Pacific nations. HAL has contributed to regional invasive species issues by membership and participation in the Pacific Invasives Partnership. Within the Pacific region, Hawai`i Ant Lab is recognized as the regional subject-matter expert for invasive ants and maintains an extensive IAS network, including membership of the Pacific Invasives Partnership (a regional IAS advisory body), and collaboration with IUSSI Invasive Species Specialist Group, Secretariat of the Pacific Regional Environment Programme (SPREP) and other invasive species groups. HAL proposes to maintain and extend involvement in the region in line with governor Ige’s commitment at the IUCN World Conservation Congress held in Honolulu, Sept 2016.

Additionally, following a request from the American Samoa Community College, HAL staff traveled to American Samoa in December 2018 to assist with scoping a new LFA outbreak and providing training and other assistance to staff from Agriculture and Invasive Species agencies there.