

University of California Cooperative Extension Guide to Environmentally Sound Argentine Ant Management

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Argentine ant, *Linepithema humile*, tending brown soft scale for honeydew

Pest Status

For most homeowners in the U.S. the appearance of ants is just another sign of spring and warm weather, but for an increasing number of Californians, ant invasions have become a year-round problem. In San Francisco, for example, many residents note an increase of structural invasions by the small brown Argentine ant, which appears to be triggered by the decline of hemipterans (plant-sucking insects such as aphids, mealybugs, and scales) in August, and in fall when the first substantial rains occur (Art Slater pers. comm., 2005); while in southern California invasions usually begin in early June and end by late summer, with indoor infestations being associated with higher temperature and aridity, reduced hemipteran populations, and rainfall (Rust et al. 1996).

Of the $\approx 12,000$ ant species so far described worldwide, 281 species inhabit California (Ward 2005); and of these, 22 are exotic species introduced from other countries. One of the most detrimental is the Argentine ant, *Linepithema humile*, an invasive species thought to have been introduced into the United States in the late 1800s into the Port of New Orleans, most likely offloaded with cargo from Brazilian coffee ships (Newell and Barber 1913). They subsequently spread rapidly in the Southeast facilitated by the railroad. Initially reported in southern California, by 1908 they had spread as far north as San Francisco.

Currently, the Argentine ant is the number one urban pest in California and also causes major problems in agriculture and wildlife areas (Vega and Rust 2001). In agriculture, they tend hemipteran pests for honeydew, a sugar-rich fluid that is the main component of their diet. The excreted honeydew also damages crops, such as citrus and grapes, due to unsightly molds which also thrive on it. The ants protect the hemipterans

from their predators and parasites thereby interfering with the natural biological control of these pests. Argentine ants can also become pests in wildlife areas, where by sheer numbers of individuals they out-compete and displace other native ant species. In Torrey Pines Park in San Diego, for example, they are displacing harvester ants, which has a negative impact on the horned lizard population because harvester ants are the lizard's main source of food (Suarez et al. 2000).

It is in the urban environment, however, that the full force of Argentine ants and their tremendous populations are felt by homeowners. Their numbers around homes can reach astronomical proportions, e.g. more than a half million ant visits to bait stations placed around homes in Riverside over a 24 hour period (Reiersen et al. 1998). In San Diego, Argentine ants make up eighty-five percent of the ants controlled by Lloyd Pest Control, the city's largest pest control firm (Field et al. 2007); with over 35,000 general pest accounts, Argentine ant control makes up the major portion of their business. About 90% of these infestations are located outside along sidewalks and driveways, and in and around gardens and foliage (Field et al. 2007).

Identification and Biology

Argentine ant workers are small (2 to 3 mm long), brown ants, with one-segmented petioles, 12-segmented antennae, and a distinct bulge on the propodeum (the first abdominal segment fused to the thorax, see photo). They cannot sting and rarely bite but do emit a musty odor when crushed. Queens are about twice the size of workers and perform other duties besides egg laying, such as foraging, and caring for young.

Argentine ants are unicolonial, i.e. there is no clear delineation between a colony and population with free flow of workers between nests. They are polygynous, meaning a colony has many queens, on average about 15 for every 1,000 workers (Aron 2001). Thus, they have a very high reproductive potential. They forage over long distances, at least several hundred feet, so infestations are not localized to a single home but rather cover entire neighborhoods (Vega and Rust 2003). Achieving control is difficult because of their large, diffuse colonies and area-wide infestations.

Control Strategies

Pest management of Argentine ants has a long history in California dating back to the early 20th century. Over the years, a number of different control strategies have been tried primarily using sprays and baits. Although perimeter sprays have been the traditional treatment strategy for controlling Argentine ants, complete barriers are almost impossible to achieve because any small gaps provide access for the ants, as well as chemical degradation and reduced efficacy due to irrigation, dense groundcover, mulch, high temperature, substrate alkalinity, and direct sunlight (Rust et al. 1996).

Baits have been another common approach, but unfortunately most of the commercial baits available are not attractive to Argentine ants, and those that are kill the ants before the bait can be dispersed through the colony (Rust et al. 2002). At best, these efforts in the past have achieved limited success. However, recently there have been some very effective control measures developed for Argentine ants both for homeowners and Pest

Management Professionals. What follows is an outline of a control strategy for homeowners that employs low toxic liquid baits.

Liquid Baits

A liquid bait is an ideal control measure for Argentine ants because it exploits their biology and social behavior. Over millions of years, ants coevolved with hemipterans, the plant-piercing and sucking insects such as aphids, mealbugs, and scales, and they have developed specialized digestive tracts and recruitment behaviors to collect and share honeydew (Hölldobler and Wilson 1990). A sweetened liquid bait can capitalize on these evolutionary adaptations if the toxicant is at a low enough concentration that it does not interfere with trophallaxis (oral exchange of food) and recruitment (Rust et al. 2004). Depending on the active ingredient the effective concentration varies; e.g. 0.5-1.0% for borates. When formulated at these concentrations the toxicant has a delayed effect and gives the ants time to distribute the bait throughout the colony.

Low toxic liquid baits have three primary advantages over sprays: (1) they are target-specific and not broadcasted in the environment; (2) they capitalize on the recruitment and food-sharing behavior of ants, whereby scout ants recruit their nest mates to newly discovered food, and these recruited ants return to the nest to share the food with the rest of the colony; and (3) there is minimal environmental impact; e.g. collateral damage to beneficial insects.

It is important to remember that only a small percentage of an ant colony forages (some estimate $\approx 10\%$). Foraging begins with scout ants leaving the nest on a meandering search path for food. Once food is located the scout collects or consumes some of it depending on whether it is a solid or liquid and then heads straight back to the nest using vector orientation (see Figure 1 below). On its way back to the nest, the scout deposits an odor trail. Inside the nest the scout shares the food with its nest mates, stimulating them in turn to leave the nest and follow the scout's direct odor trail back to the resource. As long as food is available homeward bound ants will continue to reinforce the odor trail.

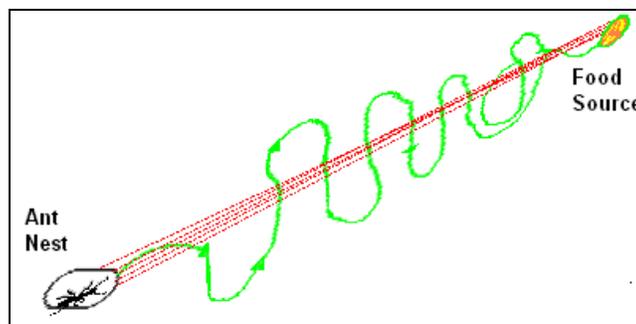


Figure 1. Green, represents a scout ant's search path for food; red, represents the recruitment trail.

Argentine ants may forage long distances and their trails may consist of thousands of ants traveling to and from nests. Research has shown that Argentine ants can forage at least 200 feet away from their nest (Vega and Rust 2003).

Bait Dispensers

In recent years specialized bait dispensers such as the KM AntPro® Liquid Bait Dispenser (see Figure 2) have been developed to provide ants with long-term continuous access to baits. The bait station is designed to be tamper and water-resistant, and durable, and to keep the bait fresh by isolating it from the ants in a gravity-feed reservoir. Argentine ants attracted to the bait can readily gain 360 degree access to the dispenser's interior feeding trough. Once inside, ant foragers activate the AntPro dispenser's stress ducts allowing the liquid bait to flow from the reservoir into the trough. Bait discharge into the trough is regulated by the consumption rate of the ants. Initially, with a heavy infestation, the ants will consume the bait at a much faster rate than later on when the ant numbers have declined due to bait toxicity.



Figure 2. AntPro® Bait Dispenser

Important features of a liquid bait delivery system for Argentine ants include:

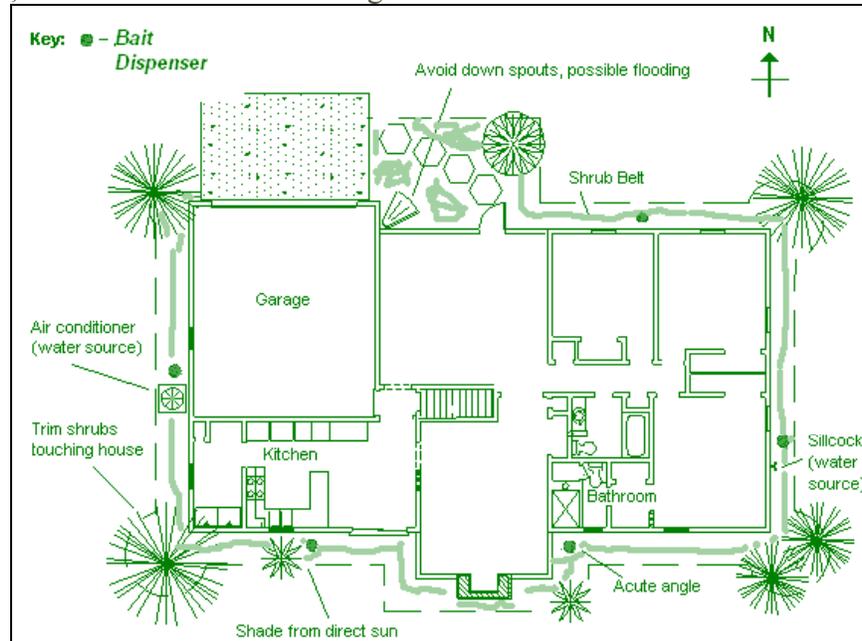
- (1) sufficient volume of sugar water based liquid bait
- (2) maintaining a constant bait formulation, i.e. little to no evaporation
- (3) preventing dead ants from accumulating in the bait
- (4) easy to refill and relocate.

Property Inspection

A thorough inspection of the house and yard is the first step in developing an effective baiting program for Argentine ants. Acquiring, or creating a simple diagram of the property is helpful for recording areas of ant activity and planning where to place bait stations.

Initially, a thorough inspection of the residence inside and out should be conducted to identify current and potential problem areas that may be conducive to ant infestations. Inside, start at the front entrance, and using a flashlight systematically inspect around the entire house, focusing on baseboards and walls where they meet the floor and ceiling, because ants often trail along these edges and other structural guidelines. Also, inspect electrical outlets, vents, fixtures, and around and under furnishings for ant activity. In the

kitchen, bathrooms and laundry where there are sources of water, open cabinets to inspect pipes and drains. Argentine ants evolved in moist habitats and are susceptible to desiccation, so water is a severe limiting factor for their survival.



Bait dispensers should be strategically placed on all sides of structure.

Outside, inspect as much of the structure both high and low as possible. If ant activity was found inside, inspect outside in the same areas for potential entry points. In some cases caulking may be sufficient to prevent their entry. Inspect the yard noting any signs of ant activity, paying particular attention to trees and shrubs, and potted plants, which might harbor hemipterans. Argentine ants are constantly seeking new sources of food and water, so keep in mind that infestations most often progress onto a property from surrounding areas. Note the location of nests. A screw driver can be used to tap utility boxes and probe the soil in potential 'hot spots' such as around trees and shrubs and other moist, shaded areas. Argentine ants also will nest in leaf litter, mulch, under rocks and other objects, and sometimes within the structure or under the foundation. Another potential problem outside is excessive watering or leaky irrigation systems. Reducing the availability of water to the ants will facilitate a more effective baiting program.

Although full sun exposure and brightly illuminated surfaces are not conducive to ant activity, at other times of the day these same areas may be teeming with ants. To avoid this problem conduct inspections in the early morning or late afternoon. Upon completion, the inspection should provide sufficient information for one to make an estimate of the number of bait stations that will be needed and where they should be placed.

Placement of Bait Dispensers

The primary considerations in a baiting program are 1) where to place the dispensers and 2) how many to use. Below are **some** guidelines to follow for successful ant control:

1) If the ants are invading the home or nesting in shrubs near the house, install at least one dispenser on each side of the structure, giving consideration to the building's size, and the number of connecting walls. For a small house or building consisting of approximately 1500 sq. ft., place one unit on each side. Some additional points to consider in bait placement:

- a) Ant traffic often converges at the junction of two walls.
- b) Ants are attracted to sources of water such as the overflow outlet on air conditioners and spigots for lawn and garden irrigation.
- c) Ant activity is often high on the north side of structures due to ample shade and moisture.



Bait dispensers partially concealed away from direct sunlight in shrubs around residence.

Ideally the dispensers should be placed where ants are trailing, preferably in shrub or tree belts so as not to interfere with lawn maintenance, but avoid locations where substantial water run-off will occur.* Also, avoid locations with **full sun exposure**. Do not put bait dispensers directly over nests, and when possible place them at least 5 ft. away from nests allowing the ants to locate the food on their own. Do not disturb nests or spray the area with insecticide.

*If an AntPro® dispenser is submerged due to unusually heavy rain, allow the water to recede. The dispenser's reservoir will not lose its bait content and foraging ants will reactivate it.

2) Guidelines for number of dispensers to use per home:

- | | | | |
|----|----------------|-------------|---------------|
| a) | 0 – 1,900 | square feet | 4 units to 6 |
| b) | 1,901 – 2,999 | “ “ | 6 units to 8 |
| c) | 3,000 - 5,000+ | “ “ | 8 units to 12 |

Maintaining Continuous Coverage of Property, Lawn and Gardens

When Argentine ant populations are no longer located near or inside the residence or structure to be protected, but are located in other areas on or near the property, relocate the dispensers to shaded areas where they are least likely to be disturbed while providing a continuous defense against re-infestation. Keep in mind that when existing ant populations are eliminated other ants will eventually move into the area. Therefore, keep

bait dispensers activated and in place serving as sentinels to prevent re-infestation. When the structure to be protected has a zero lot line, or has very little surrounding property, leave the bait dispensers in place continuously.

Many Californians take advantage of the state's ideal year-round growing conditions by planting their own gardens, citrus trees and other kinds of vegetation. Argentine ants as previously mentioned are attracted to the various honeydew-producing hemipterans found in these plants. The ants protect the hemipterans from their predators and parasites thereby interfering with their biological control.



Argentine ants tend and protect plant and tree damaging insects for their honeydew.

Placing liquid bait dispensers in proximity to the gardens and fruit trees will help control the numbers of ants. This is accomplished without broadcasting insecticides that will also destroy beneficial insects such as ladybugs and parasitic wasps.

Concluding Remarks

The Argentine ant is one of the most successful invasive ant species. It is found on six continents, and is ranked number 48 on the Global Invasive Species Database of the world's top 100 most invasive exotic animals (<http://www.invasivespecies.net/database/species/search.asp?st=100ss&fr=1&str>). In recent years research has demonstrated that Argentine ant populations can be managed and greatly reduced with the implementation of a well planned liquid baiting strategy. To achieve this goal requires some familiarization with the Argentine ant's biology and foraging behavior. Management can be achieved using this knowledge combined with a persistent and consistent year-round effort of monitoring the bait stations on a scheduled calendar basis to make sure that the baits are fresh and available where and when these ants are active.

Some recommended liquid ant baits available to homeowners on the internet include **Gourmet Liquid Ant Bait**, a sweetened bait with 1% disodium octaborate tetrahydrate, and **Terro**, a sweetened concentrate with 5% borax that can be diluted to 1%.

When these baits are delivered in the KM AntPro Station there is sufficient volume to manage the heavy infestations of Argentine ants that are typically found around homes in California.

References

- Aron, S. 2001. Reproductive strategy: an essential component in the success of incipient colonies of the invasive Argentine ant. *Insectes Soc.* 48: 25–27.
- Field, H.C., W.E. Evans, R. Hartley, L.D. Hansen, and J.H. Klotz. 2007. A survey of structural ant pests in the southwestern U.S.A. (Hymenoptera: Formicidae). *Sociobiology* 49: 1–14.
- Hölldobler, B., and E.O. Wilson. 1990. *The ants*. Cambridge, Mass.: Harvard University Press.
- Newell, W., and T.C. Barber. 1913. The Argentine ant. *USDA Bur. Entomol. Bull.* 122.
- Reierson, D.A., M.K. Rust, and J. Hampton-Beesley. 1998. Monitoring with sugar water to determine the efficacy of treatments to control Argentine ants, *Linepithema humile* (Mayr). In *Proceedings of the 1998 National Conference on Urban Entomology*, pp. 78–82.
- Rust, M.K., K. Haagsma, and D.A. Reierson. 1996. Barrier sprays to control Argentine ants (Hymenoptera: Formicidae). *J. Econ. Entomol.* 89:134–137.
- Rust, M.K., D.A. Reierson, and J.H. Klotz. 2002. Factors affecting the performance of bait toxicants for Argentine ants (Hymenoptera: Formicidae). In S.C. Jones, J. Zhai, and W.H. Robinson, eds., *Proceedings of the Fourth International Conference on Urban Pests*, pp. 115–120. Blacksburg, Va.: Pocahontas Press.
- Rust, M.K., D.A. Reierson, and J.H. Klotz. 2004. Delayed toxicity as a critical factor in the efficacy of aqueous baits for controlling Argentine ants (Hymenoptera: Formicidae). *J. Econ. Entomol.* 97: 1017–1024.
- Suarez, A.V., J.Q. Richmond, and T.J. Case. 2000. Prey selection in horned lizards following the invasion of Argentine ants in southern California. *Ecol. Applic.* 10: 711–725.
- Vega, S.Y., and M.K. Rust. 2001. The Argentine ant—a significant invasive species in agriculture, urban and natural environments. *Sociobiology* 37: 3–25.
- Vega, S.J., and M.K. Rust. 2003. Determining the foraging range and origin of resurgence after treatment of Argentine ant (Hymenoptera: Formicidae) in urban areas. *J. Econ. Entomol.* 96: 844–849.
- Ward, P.S. 2005. A synoptic review of the ants of California (Hymenoptera: Formicidae). *Zootaxa* 936: 1–68.

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