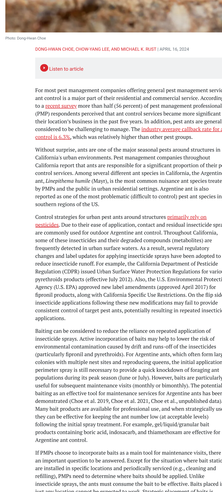
# Ant Baiting: Where Lawn and Concrete Meet

When it comes to the strategic placement of ant baits, look for places where lawn and concrete meet.



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DONG-HWAN CHOE, CHOW-YANG LEE, AND MICHAEL K. RUST | APRIL 16, 2024

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For most pest management companies offering general pest management services, ant control is a major part of their residential and commercial service. According to a recent survey more than half (56 percent) of pest management professional (PMP) respondents perceived that ant control services became more significant to their location's business in the past five years. In addition, pest ants are generally considered to be challenging to manage. The industry average callback rate for ant control is 6.3%, which was relatively higher than other pest groups.

Without surprise, ants are one of the major seasonal pests around structures in California's urban environments. Pest management companies throughout California report that ants are responsible for a significant proportion of their pest control services. Among several different ant species in California, the Argentine ant, *Linepithema humile* (Mayr), is the most common nuisance ant species treated by PMPs and the public in urban residential settings. Argentine ant is also reported as one of the most problematic (difficult to control) pest ant species in southern regions of the US.

Control strategies for urban pest ants around structures primarily rely on pesticides. Due to their ease of application, contact and residual insecticide sprays are commonly used for outdoor Argentine ant control. Throughout California, some of these insecticides and their degraded compounds (metabolites) are frequently detected in urban surface waters. As a result, several regulatory changes and label updates for applying insecticide sprays have been adopted to reduce insecticide runoff. For example, the California Department of Pesticide Regulation (CDPR) issued Urban Surface Water Protection Regulations for various pyrethroids products (effective July 2012). Also, the U.S. Environmental Protection Agency (U.S. EPA) approved new label amendments (approved April 2017) for fipronil products, along with California Specific Use Restrictions. On the flip side, insecticide applications following these new modifications may fail to provide consistent control of target pest ants, potentially resulting in repeated insecticide applications.

Baiting can be considered to reduce the reliance on repeated application of insecticide sprays. Active incorporation of baits may help to lower the risk of environmental contamination caused by drift and runs-off of the insecticides (particularly fipronil and pyrethroids). For Argentine ants, which often form large colonies with multiple nest sites and reproducing queens, the initial application of perimeter spray is still necessary to provide a quick knockdown of foraging ant populations during its peak season (June or July); however, baits are particularly useful for subsequent maintenance visits (monthly or bimonthly). The potential of baiting as an effective tool for maintenance services for Argentine ants has been demonstrated (Choe et al. 2019, Choe et al. 2021, Choe et al., unpublished data). Many bait products are available for professional use, and when strategically used, they can be effective for keeping the ant number low (at acceptable levels) following the initial spray treatment. For example, gel/liquid/granular bait products containing boric acid, indoxacarb, and thiamethoxam are effective for Argentine ant control.

If PMPs choose to incorporate baits as a main tool for maintenance visits, there is an important question to be answered. Except for the situations where bait stations are installed in specific locations and periodically serviced (e.g., cleaning and refilling), PMPs need to determine where baits should be applied. Unlike insecticide sprays, the ants must consume the bait to be effective. Baits placed in just any location cannot be expected to work. Strategic placement of baits is critical to maximize the bait consumption by foraging ants and the ultimate impact on the pest ant populations. In fact, baits start losing their palatability (attractiveness as food) from the moment they are applied in the environment. Since all ant foragers are liquid feeders, keeping the bait hydrated (minimal water loss) is vital to maximize bait consumption. Contamination and degradation might also impact bait palatability over time. Placing baits in the areas where the ants are currently traveling or foraging will ensure maximum bait consumption. Considering the baits are typically more expensive than the spray product (based on the product cost to treat a unit area), strategic placement of baits is also crucial from an economic standpoint.

Label information on bait products usually includes specific tips regarding bait placement. For example, one commercial ant bait product label states, "place bait on, into, or adjacent to structures where ants are observed, adjacent to ant trails and to areas suspected of ant activity." Another product's label instruction states, "locate areas around the building where ants are seen trailing. Apply the bait in areas inaccessible to children and pets. For a perimeter defense system, place bait stations near the foundation or where ant trails are found." UC IPM pest ant management webpage states "use baits primarily outdoors…Place bait stations where ants can easily find them, but avoid placing them in areas accessible to pets and small children. Place baits near nests, on ant trails beneath plants, or along edges where ants travel." In essence, these instructions require knowledge of the locations where the ants are currently active or likely will be in the near future (e.g., within a day). Finding ant trails might be easy if homeowners have observed or reported the ant infestation. However, finding active ant trails during a service visit could be time-consuming and challenging for outdoor ant baiting. The amount of time a PMP spends to treat one residential house varies depending upon the specifics of the structure. For typical residential buildings, technicians spend about 50 minutes per account (unpublished data). This includes the time needed for inspection, treatment, notifications, and even communication with the homeowners. Time for careful inspection to discover active trails of Argentine ants around the structure is undoubtedly limited.

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Is there any quick and reliable way to identify the most likely places where Argentine ants would trail and forage in residential outdoor settings? It is possible to quickly determine the best sites for bait placement without looking for ant trails? Argentine ants are known to rely on chemical signals (trail pheromone) as well as structural features (structural guidelines) when maneuvering in the environment (Klotz et al. 1997). Luckily, many residential settings share some common structural features – concrete, lawn, mulch, plant, soil, etc. If certain features can be used to reliably locate the foraging ant trails, that would help reduce the time needed to look for ant trails during bait applications.

A simple field experiment was designed to answer this question. The study was conducted in October 2023 on the University of California, Riverside campus. Several site types were identified based on the structural characteristics. Five of these site types were characterized by the presence of a single surface type or a single characteristic item – lawn (L), concrete (C), dumpster or trash can (D), tree (T), vegetation/bush (shoot plant without trunk; V). Five other site types were characterized by the presence of two surface types and the interface between them – lawn and concrete (LC), soil and concrete (SC), mulch and concrete (MC), building and soil (BS), and building and concrete (BC). The list of site types is provided in Table 1. The experiment was replicated 5-15 times for each site type. At 10 a.m, small squares of cotton (monitoring squares) soaked in 25% (wt/wt) sucrose solution were placed in these sites. The monitoring squares were collected in one hour, and Argentine ants on the cotton squares were counted. The number of ants on the monitoring square was used as the quantitative indicator for ant foraging activity.

**Table 1.** Sites included in the study.

| Site types | Surface/characteristics |
|---|---|
| L | Lawn |
| C | Concrete |
| D | Dumpster/trash can |
| T | Tree |
| V | Vegetation/bush |
| LC | Lawn – concrete interface |
| SC | Soil-concrete interface |
| MC | Mulch – concrete interface |
| BS | Building (vertical surface) – soil interface |
| BC | Building (vertical surface) – concrete interface |

The data are shown in Fig. 1. The overall data suggest the interface between lawn and concrete (LC) was the location with the highest level of Argentine ant foraging activity. The interface between lawn and concrete (LC) had a much higher number of ants than its single-surface counterparts (L, lawn only or C, concrete only). Bases of the tree (T) and dumpster site (D) also had a good amount of ant activity, but there can be significant amounts of variation in ant activity, especially for the dumpster sites (i.e., hit-or-miss). Open concrete surface (C) had the lowest level of foraging activity. Lawn (L), vegetation/bush (V), and four other interface types (SC, MC, BS, and BC) showed intermediate levels of ant activity.


Graph: Dong-Hwan Choe
**Fig. 1: Average number (± SEM) of Argentine ants on the monitoring square.**

Certain structural and landscape features can be used to quickly determine the best locations for inspection and bait (liquid or gel) placement against Argentine ants. Interfaces between lawns and concrete are among the most common structural features of residential outdoor environments and various concrete surfaces, such as driveways, sidewalks, patios, and landscape curbing (Fig. 2). There are possible reasons why the Argentine ants prefer to trail along the interface between lawn and concrete. Preferred microclimate conditions (moisture, temperature) may exist in that location. The absence of heavy vegetation along the lawn and concrete interface (ease of travel), but still with some level of protection (partially shaded), may also be preferred by trailing ants. Environmental factors such as relatively high humidity and partial protection from direct sunlight would also be advantageous in keeping the liquid or gel bait palatable for extended periods.

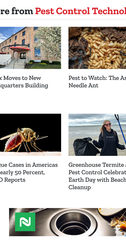

**Fig. 2: Examples of lawn-concrete interface in residential settings. The picture on the left shows one of the lawn-concrete sites tested in the experiment.**

It is vital to effectively manage pest ants in urban environments with minimal impacts on human health and the environment. To help reduce our reliance on repeated application of spray products, baiting should be considered for maintenance service visits for pest ants. To maximize the impact of baiting, the baits should be placed along lawn and concrete surfaces. Many pyrethroid-containing spray products often have strict limitations when treating sites that abut nonporous horizontal surfaces (e.g., driveway, sidewalks) which is not protected from rainfall and water from sprinklers. Baits can be applied to these areas that cannot be sprayed. Of course, a control program should not rely only on baiting but also be supplemented with non-chemical techniques such as exclusion, sanitation, removal of honeydew sources, and water management. It is important to note that the information and data discussed in this article are focused on Argentine ant and sugar-based bait products targeting this species. Thus, the information may or may not directly apply to other ant species with different feeding habits, foraging strategies, and (or) population structures.

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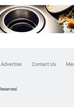

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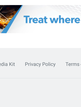

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