Green Bulletin

A newsletter for landscape and structural pest managment professionals

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In this issue:

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Produced by the Urban and Community IPM Team of the University of California Statewide Integrated Pest Management Program, with partial funding from the USDA NIFA CPPM Extension Implementation Program.

Strategic Placement of Ant Baits

Ants are one of the major seasonal pests around structures in California's urban environments. Pest management companies throughout the state report that ants are responsible for a significant proportion of their pest control services. In urban residential areas of California, the Argentine ant, Linepithema humile, is the most common nuisance ant species treated by pest management professionals (PMPs) as well as the public themselves (Figure 1).

CA Reynolds, UC IPM

Figure 1. Perimeter spray for ant management around a home.

While contact insecticides are frequently used to control Argentine ants, they also contribute to environmental contamination via drift and runoff. However, insecticide applications following California's recent regulatory changes and label updates may fail to control target pest ants consistently, potentially resulting in repeated insecticide applications (Choe et al. 2021).

Baiting for ant control

Baiting (Figure 2) can reduce the need for insecticide spray applications. Active incorporation of baits in a management program may help to lower the risk of environmental contamination caused by insecticide drift and run-off. For Argentine ants, which often form large colonies with multiple nest sites and reproducing queens, the initial application of perimeter spray would be still needed to provide a quick knockdown of foraging ant populations during peak season (June or July). However, baits are particularly useful for subsequent maintenance visits (monthly or bimonthly). In fact, baiting has

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D-H Choe, UCR

Figure 2. Ants consuming a gel bait.

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been demonstrated to be an effective tool for maintenance services for Argentine ants (see References).

Many bait products are available for professional use, and when strategically used, they can be effective at keeping ant numbers low (at acceptable levels) following the initial spray treatment. Gel, liquid, and granular bait products containing boric acid, indoxacarb, and thiamethoxam are effective for Argentine ant control.

Importance of bait placement

If PMPs choose to incorporate baits as a main tool for maintenance visits, there is an important question to be answered: Where to place the bait? Unless bait stations are already installed in specific locations and periodically serviced (e.g., cleaning and refilling), PMPs must determine where the baits need to be applied during their visit.

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 control of 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. Baits are typically more expensive than insecticide sprays (based on the product cost to treat a unit area), so 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." In essence, these instructions require knowledge of the locations where the ants are currently active or likely will be within a day or two.

Finding ant trails might be easy if customers have already observed or reported the ant infestation. However, finding active ant trails could be time-consuming, and time for careful inspection to discover active ant trails around the structure during a service visit is often limited.

Ant trail location study

Is there a quick and reliable way to identify the most likely places where Argentine ants would trail and forage in residential outdoor settings? Knowing this would make it 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). Many residential settings share some common structural features such as concrete, lawn, mulch, plant, and soil. If common features can be used to reliably locate the foraging ant trails, that could reduce the time needed to look for ant trails during bait applications.

A simple field experiment was designed to identify the best sites for bait placement. The study was conducted in October on the University of California, Riverside campus. Several site types were identified based on 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 trashcan (D), tree (T), vegetation/bush (short 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 5-13 times for each of the site types. Small squares of cotton (monitoring squares) soaked in 25% (wt:wt) sucrose solution were

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Ant Bait Placement

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placed in these sites. The monitoring squares were collected after 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.

The overall data suggest the interface between lawn and concrete (LC) was the location with the highest level of Argentine ant foraging activity (Figure 3). 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 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.

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 settings. For example, they are found between lawns and various concrete surfaces, such as driveways, sidewalks, patios, and landscape curbing (Figure 4).

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.

Table 1. Sites included in the study.

Site types	Surface/characteristics
L	Lawn
C	Concrete
D	Dumpster/trashcan
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

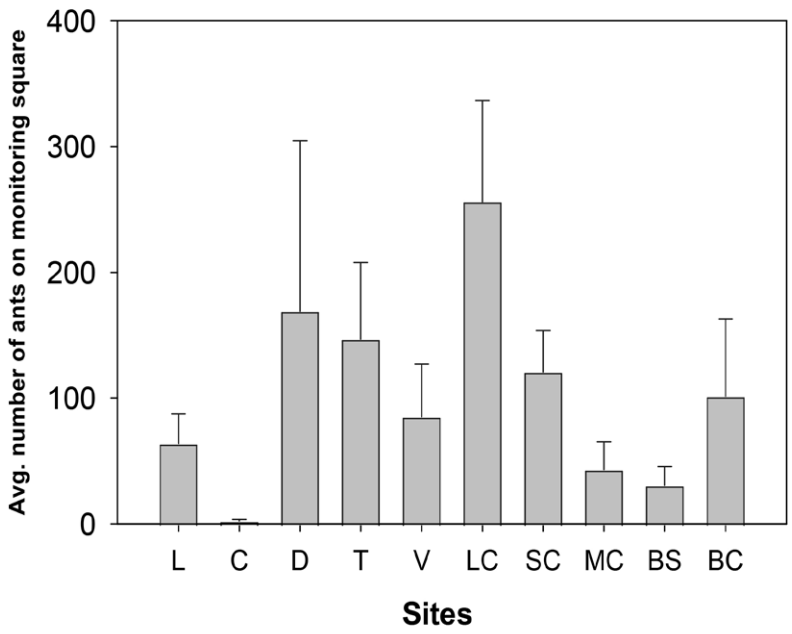

Figure 3. Average number (± SEM) of Argentine ants on the monitoring square.

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Take-home message

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 insecticide 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. 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, or population structures.

For more information about ant management, see the UC IPM Ant page https://ipm.ucanr.edu/PMG/invertebrates/links.ants.html

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Figure 4. Examples of lawn-concrete interface in residential settings. The picture on the left shows one of the lawn-concrete sites tested in the experiment.

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Managing Pocket Gophers

Pocket gophers can cause significant damage to valuable turf, girdle trees, and chew irrigation lines. Their mounds can create tripping hazards and lead to erosion concerns when found on slopes. Luckily there are multiple successful management options to choose from when it comes to managing pocket gophers.

Do I have a pocket gopher?

Pocket gophers are small burrowing rodents that are often identified from the damage they cause rather than a sighting of the animal itself. Pocket gophers spend most of their time below the surface and while it is possible to see them above the ground, or peeping out of a burrow (Figure 1), the easiest way to determine the presence of pocket gophers is by the crescent-shaped mounds they leave behind on the surface from excavating their burrows. Pocket gopher mounds can be differentiated from mole mounds by their shape—mole mounds will be round whereas pocket gopher mounds have the distinctive crescent shape. Pocket gophers do not hibernate and are active year-round, so it is important to be vigilant when managing pocket gophers.

Management options

There are many management options for pocket gopher control and in California, significant research has been conducted to better utilize and examine the effectiveness of many of these tools. While there continues to be restrictions on some of the toxic options for pocket gopher management, there are still multiple non-chemical options to choose from that fit well into an IPM plan. Pocket gopher trapping has proven to be one of these very effective methods.

Trapping

Trapping is an excellent option for managing pocket gophers, even if you think you have a large population. In general, there is only one pocket gopher per tunnel system, so once you have captured one, you can move to the next system. Be aware that during the breeding season, there could be both a male and female in the burrow system, and after the female gives birth and the pups are dispersing, you can find the pups in the burrow system with reproducing

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Figure 1. Pocket gopher looking out of its mound in a clover-filled lawn.

females. In these scenarios, you might capture more than one pocket gopher per trap set.

Trapping takes longer when compared to toxic bait application or burrow fumigation with aluminum phosphide but is can be highly effective when done correctly.

Make sure you have the right tools when it comes to trapping pocket gophers. It is important to have sufficient traps for the population you are dealing with. Focus trapping efforts on fresh mounds, as older mounds are less likely to be active. If you are unsure what mounds are active, you can knock over all mounds and trap at the new mounds that appear. Pocket gophers may not mound every day, so trap over more than one day to be successful. It is worth noting that it can be difficult to determine individual burrow systems from each other. Some practice is required to better define which mounds are likely from the same individual. If a trap set is not successful after 1 or 2 days, move it to a new tunnel location.

Trap selection (Figure 2) and placement may be important when choosing trapping as your pocket gopher control method. In studies, the Gophinator trap caught larger pocket gophers at a higher rate than the Macacbee trap. In addition, these traps often require larger excavations in the soil. For areas like high value turf, these traps may not the best option. An alternative trap is one resembling the GopherHawk, which may cause less damage because

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they don't require as large of an excavation in the soil.

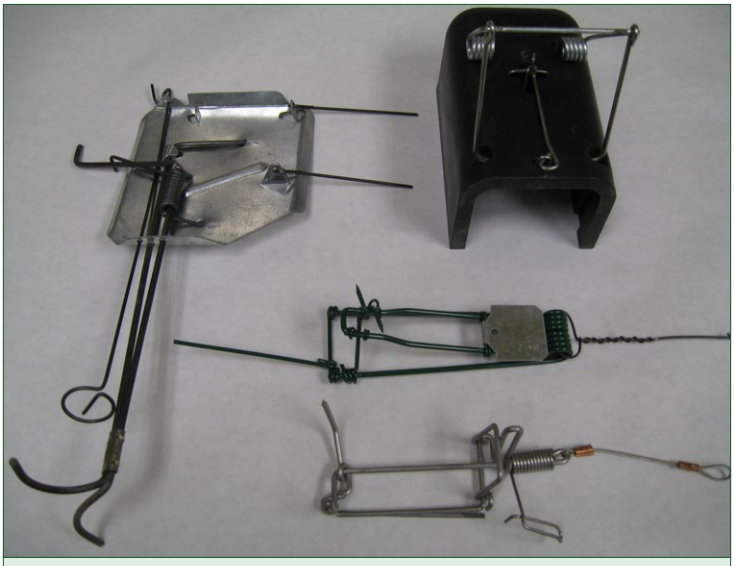
When you set a pincher-style trap like the Macabee or the Gophinator, or a box-type trap like the Black Box or Black Hole, it is important to locate the main run of the burrow system. To do this, take a long metal rod like a screwdriver and probe around the mound. You will need to stick your probe into the ground at depths of about 4 to 12 inches. When you find the tunnel, you will experience a sudden drop in resistance. This skill is difficult to acquire but will improve with practice. Once you have located the main run, you need to excavate an opening in the tunnel to allow for setting of the trap. You can use a hori-hori knife or a trowel to make this hole, which may need to be more or less extensive depending on which style trap you choose.

If you are using a pincher-style trap that is set inside the tunnel, make sure that the tunnel you are setting the trap in is straight. You can check this by putting your excavator tool into the tunnel and making sure that at least 6 inches of it fits into the tunnel. This way you know the tunnel doesn't turn; tunnels with turns often allow the pocket gopher to bypass the jaws when activating the trap, thereby resulting in triggered traps that miss the gopher.

Several attractants have been tested but they did not influence visitation or capture rates of pocket gophers to traps. Attractants also did not influence the gender of pocket gophers captured. There is no impact of human scent on the success of trapping pocket gophers.

Is blocking light by covering trap sets necessary when trapping for pocket gophers? Covering and uncovering pocket gopher trap sets is time consuming and does not result in a greater number of captures. However, if you are trapping in areas with high foot traffic, there may be some benefits to covering your trap sets. You can cover the traps with sod, landscape cloth, or something like cardboard or plywood to prevent people or pets from interfering with your trap sets. In general, it is recommended that you cover sets when using box traps, since pocket gophers will likely plug tunnels before hitting the trigger wire of these traps if you leave them uncovered.

It can be helpful to tie a flag to the traps so you can easily remember where they were set. This can also help you recover the trap if the gopher drags it away.



RA Baldwin, UCD

Figure 2. Types and brands of gopher traps include (clockwise from upper right) Victor Black Box, Macabee, Gophinator, and Cinch.

When you recover a dead pocket gopher, remove it from the trap, put the gopher back in the tunnel, and cover it up. You can also double bag the animal and place it in the trash. Always wear gloves when handling pocket gopher or any other wildlife carcasses.

Toxic baits

There are several options for pocket gopher management using toxic baits. It is important to ensure that bait is placed correctly in the tunnel either by using a probe with a bait applicator or by hand using a funnel and spoon. Always read and follow the label. Many toxic baits that are used to manage pocket gophers require a restricted materials permit. However, there may be exemptions for products applied for structural pest control, industrial use, and institutional use.

Strychnine is the most effective type of bait used for pocket gopher management. This toxicant is an acute rodenticide where a lethal dose can be acquired after a single feed. Pocket gophers can develop behavioral resistance to strychnine. This enables pocket gophers to consume what is normally more

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than the lethal amount by periodically eating sub-lethal amounts. Pocket gophers also can be physiologically tolerant to strychnine since after they ingest a series of higher doses of strychnine, they can tolerate increasingly higher doses of it. It is important to rotate strychnine in with other management tools to avoid this type of resistance.

Zinc phosphide is also an acute rodenticide that is lethal after a single feeding. Bait shyness or taste aversion can be associated with this management option. Because of this, zinc phosphide may not perform as well as strychnine.

First generation anticoagulant rodenticides, including chlorophacinone and diphacinone, are multiple-feeding anticoagulants that are less toxic than strychnine and zinc phosphide. Since these baits require multiple feedings over 3-5 days, it is important to make sure that there is a continuous supply of bait during your treatment period. Diphacinone is restricted following recent legislation and cannot be used in residential areas and most industrial and institutional areas, including many non-production agricultural sites such as cemeteries, golf courses, parks, highways, and railroads.

Fumigation

Aluminum phosphide is highly effective, especially in moist soils. However, aluminum phosphide is a highly restricted material. It must be applied by a certified applicator, or the application must be supervised by a qualified applicator. You must have a restricted materials permit, a written recommendation to apply on production or non-production agricultural sites, and a Notice of Intent (NOI) from your local Agricultural Commissioner. You are also required to have a Fumigation Management Plan. You are not permitted to apply this product within 100 feet of a potentially occupied structure. The only place on school grounds where it is permitted to apply this product is on athletic fields.

Gas cartridges are not effective because pocket gophers seal off their burrow when they detect the smoke.

Carbon monoxide producing machines and carbon dioxide are registered for use in California against burrowing rodents. Carbon monoxide producing machines are registered devices, while carbon dioxide used for rodent control is considered a registered pesticide.

Carbon monoxide devices generate carbon monoxide which fills the burrow system and asphyxiates the pocket gopher. These devices include the BurrowRx, Cheetah Rodent Controller, CO Jack, and Pressurized Exhaust Rodent Controller (PERC) Machine. Research has shown that the PERC machine can be moderately effective at managing pocket gopher populations. Its efficacy increases in moist soil conditions. Some of these devices are more suited for urban applications and some for larger scale production agriculture. You are not permitted to use a carbon monoxide pest control device within 100 feet of a structure inhabited by people or domestic animals, whether occupied or not.

Carbon dioxide gas is a pesticide that is registered for use on several sites that include production agriculture, non-production agricultural sites, and residential areas. There are no distance restrictions for the application of this pesticide. It is important to follow the label. Solid carbon dioxide (dry ice) is not registered for use on pocket gophers.

Natural Predators

Vertebrate predators—including owls, snakes, cats, dogs, and coyotes—eat pocket gophers. However, they will rarely control all pocket gophers in an area.

Jack Kelly Clark, UC IPM

Figure 3. Owl box in a walnut tree. Barn owls can provide limited pocket gopher control in orchards.

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Predators rarely remove every prey animal but instead move on to hunt in areas with more prey. In addition, pocket gophers have defenses against predators. For example, pocket gophers can evade snakes in their burrows by pushing up an earthen plug to block the snake's advance. Relying solely on natural predators might not control pocket gophers to the desired level. Research has shown that pocket gophers appear to be an important prey animal for barn owls nesting in perennial crops, and thus barn owls may be able to provide some pest control services in those areas.

Exclusion

Exclusion can be difficult and expensive for pocket gopher management, but it may be justified if you are trying to protect individual or high-value landscape plants. You can use hardware cloth (1/2-3/4-inch mesh) buried at least 2 foot deep with an additional 6 inches of hardware cloth bent at a 90° angle. You should also extend fences at least 1 foot above the ground because pocket gophers may move above ground to access the planting you are trying to protect. There are wire baskets available to protect individual plants or bulbs from pocket gophers. These baskets can also be fashioned from chicken wire. Remember that it is important not to restrict the growth of the plant inside the basket, so ensure the wire basket is large enough to accommodate the adult plant's root structure.

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For more information about pocket gopher management, see the UC IPM *Pest Notes: Pocket Gophers:*

https://ipm.ucanr.edu/PMG/PESTNOTES/pn7433.html

Revised *Pest Notes*


UC IPM *Pest Notes*, Publication 74132

Damping-off Diseases in the Garden

Integrated Pest Management for Home Gardeners and Landscape Professionals

IDENTIFICATION AND BIOLOGY

Damping-off Diseases in the Garden

Planting seeds too soon, when the soil is cold and wet, risks losing them to damping-off, a disease caused by fungi and oomycetes in the soil. Learn more about this common disease in the newly revised *Pest Notes: Damping-off Diseases in the Garden* by UC IPM Director Dr. Jim Farrar and UCCE emeritus advisor Ed Perry.

They cover the biology of the pathogens and identification of the disease. Color photographs of plants succumbing to damping-off are included in this publication and can help identify the problem. To help manage damping-off, the authors have added sections on how to prevent damping-off disease for both growing transplants and seeding directly into the ground.

Online at https://ipm.ucanr.edu/PMG/PESTNOTES/pn74132.html

Ask the Expert!

Q: One of the top pests I treat for is ants. I tell homeowners there are things they can do to help our treatment efforts and keep them ants out. Are there resources I can give them that list some of these details?

A: The UC IPM Program has multiple resources for ant management both for professionals, the general public, and homeowners.

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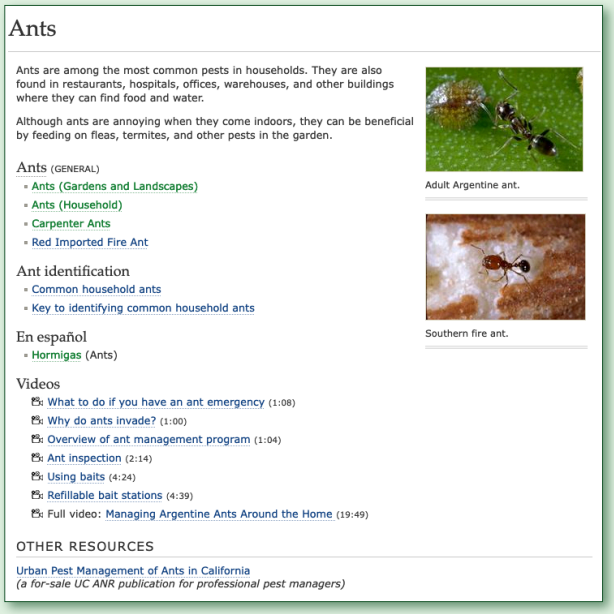
Trail of Argentine ants on a sidewalk.

The Ants resource page at https://ipm.ucanr.edu/PMG/invertebrates/links.ants.html has information on ants in the garden, within homes and structures.



Ants

Ants are among the most common pests in households. They are also found in restaurants, hospitals, offices, warehouses, and other buildings where they can find food and water.

Although ants are annoying when they come indoors, they can be beneficial by feeding on fleas, termites, and other pests in the garden.

Ants (GENERAL)
- Ants (Gardens and Landscapes)
- Ants (Household)
- Carpenter Ants
- Red Imported Fire Ant

Ant identification
- Common household ants
- Key to identifying common household ants

En español
- Hormigas (Ants)

Videos
- What to do if you have an ant emergency (1:08)
- Why do ants invade? (1:00)
- Overview of ant management program (1:04)
- Ant inspection (2:14)
- Using baits (4:24)
- Refillable bait stations (4:39)
- Full video: Managing Argentine Ants Around the Home (19:49)

OTHER RESOURCES

Urban Pest Management of Ants in California
(a for-sale UC ANR publication for professional pest managers)

Adult Argentine ant.

Southern fire ant.

Quick Tips UC IPM

Ants

Although ants are annoying when they come indoors, they can be beneficial by feeding on fleas, termites, and other pests in the garden.

Argentine ants trailing on pavement.

Spraying them with pesticides will not prevent more ants from entering. Most ants live outdoors, so focus on keeping ants from entering buildings. Combine several methods such as caulking entryways, cleaning up food sources, and baiting with pesticides when necessary. Avoid spraying pyrethroids (like bifenthrin and cyfluthrin), especially on hard surfaces such as driveways or sidewalks or around the foundation of buildings. These products pollute waterways.

Make your home less attractive to ants.

- Caulk cracks and openings that provide entry into buildings.
- Store food in clean, sealed containers.
- Clean up crumbs, grease, and spills.
- Fix leaky faucets since they can attract thirsty ants.
- Take out the garbage and clean trash cans regularly.
- Remove or manage sweet food sources next to your house such as aphid-infested bushes and ripened fruit on trees.
- Keep plants, grass, and mulch at least a foot away from the foundation of buildings to reduce ant foraging and nesting.

For more information about managing pests, visit ipm.ucanr.edu or your local University of California Cooperative Extension office.

The *Pest Notes: Ants* contains useful information pest management professionals can share with customers and the *Quick Tips: Ants* is a short and simple overview of pest management for ants aimed at the general public.

Always read and carefully follow all precautions and safety instructions provided on the pesticide container label, as well as any other regulations regarding the use of pesticides. Not following label directions, even if they conflict with information provided herein, is a violation of state and federal law.

No endorsements of named products are intended, nor is criticism implied of products not mentioned.

For more information about managing pests, contact your University of California Cooperative Extension office, or visit the UC IPM website at ipm.ucanr.edu.