Green Bulletin

A newsletter for landscape and structural pest managment professionals

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In this issue:

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Baits Eliminate and Prevent Subterranean Termite Colonies

Subterranean termites (Family Rhinotermitidae) are considered the most serious wood-destroying pests in the world, causing an estimated $32 billion in global economic impact each year. California is home to both native and introduced subterranean termite species (Figure 1). Infestations of wooden structures are widespread and common. Pest control operators (PCOs) have conventionally applied liquid termiticides to control these pests, usually as soil drenches or injections around structures. These treatments may not always be effective, however, especially if good underground coverage is not achieved, if local termite pressure is very high, or if dealing with the invasive Formosan subterranean termite in southern California. Furthermore, the active ingredients in most liquid termiticides are increasingly monitored by the State as environmental contaminants and may be subject to legal restrictions in the future.

Bait systems for subterranean termites (Figure 2), which employ slow-acting insecticides that kill worker termites by preventing successful molting, may represent effective alternatives to liquid treatments. Baits, deployed within stations installed in the ground or in line with aboveground shelter tubes, have gained popularity during recent decades and are now considered the primary subterranean termite control tactics in many parts of the world. Adoption of bait systems in California has lagged most other regions, however. Reasons PCOs in California

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Figure 1. Colony of western subterranean termites

A Sutherland, UCCE

Figure 2. Sentricon Always Active bait tube damaged by termites (with adjacent black monitoring station) approximately 6 months after installation at a single-family home research site in Berkeley.

Termite Bait Study *continued from p. 1*

have reported being reluctant to use bait systems include 1) time required to achieve control is too long, 2) little efficacy data in California, and 3) the regular monitoring of bait systems is too labor intensive or otherwise does not fit established business models.

Recently, the third "adoption barrier" may have become less important: new product label guidelines allow PCOs to extend inspection intervals up to 12 months and allow for baiting without the previously required monitoring phase (provided the target pest is confirmed at the site). Considering the regular revenue streams created by "controlled service agreements", where PCOs contract with property owners to prevent and control pests over a long term, these newer labels should drive more widespread use.

Some observations and case studies indicate that, indeed, bait system adoption is now slowly increasing in California. To address the other two reported barriers (speed of control and efficacy), we secured funds from the state's Structural Pest Control Board to evaluate and demonstrate three different in-ground bait systems in the San Francisco Bay Area and the greater Los Angeles area.

Bait Efficacy

Our first objective was to evaluate efficacy at single-family homes. To do this, we collaborated with five different PCO companies who expressed interest in the new business models made possible by the newer bait product labeling guidelines. Some of these companies had experience with baits, while some gained their first experiences through this project. Companies received research stipends to subsidize their participation. Fifteen single-family homes were eventually selected, based on several experimental criteria: 1) documented activity of subterranean termites within 1 meter of the structure, 2) no liquid termiticide application within the previous 5 years, and 3) no significant structural infestations detected during the initial inspection. Participating homes were in Alameda, Contra Costa, Los Angeles, Orange, and Santa Clara counties. Bait stations, baits, service equipment, and, in some cases, training, were provided by manufacturers.

The UC research team and the PCOs installed bait systems according to product labels, usually with one bait station for every 10–20 linear feet of the structural perimeter. Since all 15 sites had confirmed termite activity at the perimeter, all stations installed contained active bait, rather than monitors. The UC research team installed monitoring stations with wooden blocks immediately adjacent to each bait station. The UC team then visited each participating home every 3 months for 2 years, checking termite activity within monitoring stations and collecting termites whenever possible. The PCOs and the UC team visited each participating home every 6 months to check termite activity within bait stations, replenish baits (as per product label), and to collect termites. Collected termite specimens were sent to a collaborating lab for DNA analysis, where each sample was assigned a "Colony ID" based on its genetic signature,

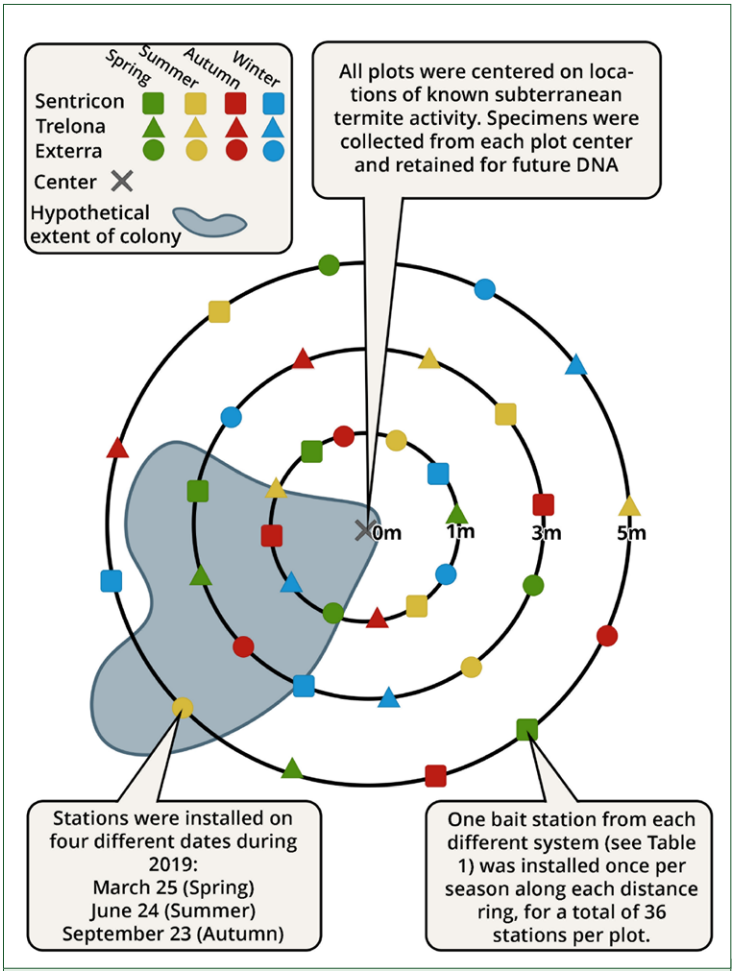

Figure 3. Schematic diagram of experimental design used to evaluate the effects of installation season, distance from observed activity, and bait system on bait interception time.

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Termite Bait Study *continued from p. 2*

distinguishing it from all other colonies. At the end of the 2-year period, a final structural inspection was conducted at each home.

Findings

Most importantly, despite significant termite pressure, none of the 15 homes became infested during the study period. Foraging termites were observed and collected during initial inspections, from wood blocks during quarterly inspections, and from bait matrices during bi-annual inspections with PCOs. In some cases, termites were observed and collected from bait stations only 6 months after installation. 132 separate samples of western subterranean termites (*Reticulitermes hesperus* species complex) were collected. DNA analysis revealed that many of our research sites included between 3 and 5 unique colonies; 1 property included 15 unique colonies! Bait was consumed at all sites, to varying degrees. No termite colony recovered from bait stations was ever detected again.

These observations strongly suggest that all three studied bait systems were effective at eliminating termite colonies and at preventing structural infestations over a 2-year period. Furthermore, post-project surveys conducted with property owners and PCOs indicated that all parties were satisfied with the services provided and control achieved; several companies new to baiting have now embraced the program we demonstrated as a new service offering for their customers.

Reducing "time-to-attack"

Our second objective in this research project was to investigate factors influencing bait interception time (also called "time-to-attack"). One explanation for lengthy bait interception times in California may be the interaction of climate (hot summers with little to no rain) and soil texture (high proportions of clay). Termite foraging at or near the soil surface may be limited or even nonexistent during summer months, especially when areas are not irrigated. Some research supports this idea: western subterranean termites have been observed to forage near the surface mostly during winter months in southern California. This suggests that baits installed in summer may sit uninvestigated for 6 months or more. To test this hypothesis, we established five research plots at the UC Berkeley Richmond Field Station directly on top of areas where naturally occurring *Reticulitermes* termites had been observed or collected. Around these areas, we established 3 concentric rings of bait stations at 3 distances from the center, installing 1 station from each of 3 registered systems (Table 1) along each of the 3 distance rings at the beginning of each season over 1 year, for a total of 36 bait stations per plot. We didn't want to kill the termites in these plots because that would significantly confound our data, so we used cellulose bait matrices from manufacturers that did not contain the active ingredients. We also installed monitoring stations containing wood blocks at the center of each plot and along each of the three distance rings. We then checked each station every 2 months for 2 years, recording bait consumption and termite incidence.

Of the 180 bait stations and 20 monitoring stations installed, 78 bait stations and 9 monitoring stations had been hit by the end of the 2-year project period, representing an overall hit rate of 44%. Three stations were attacked within 60 days after installation, and 10 stations were attacked within 120 days. Overall, however, the average bait interception time was 367 days, supporting the general claims of California's pest control operators that baiting may take too long for most remedial termite control jobs. There were no significant differences between the three bait systems or the three distance rings.

Our study's main question was whether installation season significantly impacts "time-to-attack" due to seasonal differences in termite foraging in California. To answer this, we pooled data from all five sites and all three bait systems and then considered just the first year of observations. The result was clear: baits installed at the beginning of winter (December 16) were intercepted ~100 days faster than baits installed at the beginning of summer (June 24)!

Conclusions

Bait stations systems may be very useful pest control tactics for use against subterranean termites in California, especially when dealing with very large

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Termite Bait Study *continued from p. 3*

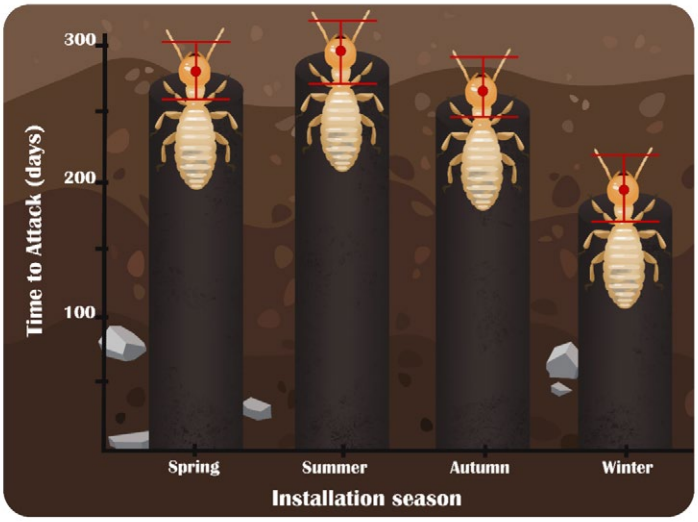

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Figure 4. Time required for western subterranean termites to begin consuming baits installed during four different seasons in California's San Francisco Bay Area. Red points on termite heads represent the average time-to-attack (number of days between installation and first observation of bait consumption). Red bars extending above and below each point represent standard error of the mean.

colonies of native western subterranean termites, multiple colonies, sensitive sites, or sites where liquid treatments have failed. According to the labels of the three products evaluated, systems can be installed with active ingredients present on Day 1, provided a licensed Field Representative has detected and identified the target species at the site. Licensed Applicators may, according to label language and California's Structural Pest Control Act, then service bait stations, replenishing bait that has been consumed or damaged. Two of the systems evaluated allow for annual inspections, while one allows for bi-annual (every 6 months) inspections. Operators in California may decrease the bait interception time, and therefore the perceived early efficacy, by targeting initial installations for the beginning of the wet season.

—Andrew Sutherland,
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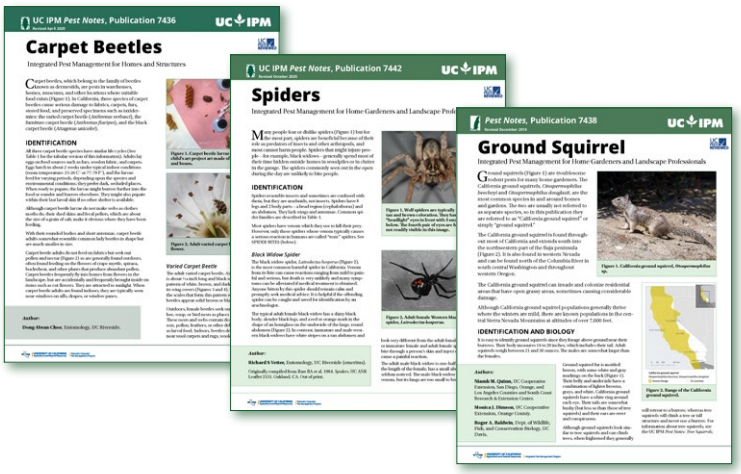
Table 1. Bait systems evaluated as part of a two-year collaborative research project at 15 single-family homes in the San Francisco Bay Area and the greater Los Angeles area.

Bait System, Manufacturer	Bait Information	Installation Specifications (for in-ground use)	Service Specifications
Sentricon Always Active, Corteva Agriscience	Recruit HD Termite Bait (EPA# 62719-608): cellulose tube, 0.5% noviflumuron	≤ 20 feet intervals; buildings, fences, decking, utility poles, trees	Inspections at least once annually; replace bait if damaged or ≥ 1/3 consumed
Advance Termite Bait System (ATBS), BASF	Trelona Compressed Termite Bait (EPA# 499-557): cellulose wafers in plastic housing, 0.5% novaluron	≤ 20 feet intervals; buildings, trees, wood piles, landscape elements, railroads	Inspections at least once annually; replace bait if damaged or ≥ ½ consumed
Exterra Termite Baiting System, Ensystex	Isopthor Termite Bait (EPA# 68850-2): cellulose wafers within burlap sachet, 0.25% diflubenzuron	≤ 20 feet intervals; buildings and other structures	Inspections every 45–120 d, up to 6 months allowed; replace bait "after sufficient consumption"

Pest Notes: How to Make Them Work for You

The *Pest Notes* series is UC IPM's free, science-based, peer reviewed publications that cover about 180 common pests in and around homes and other structures, landscapes, and gardens. They contain information on a pest's identification, life cycle, impact, and management.

Under the management section, we offer solutions on how to prevent the pest from establishing or becoming an issue, as well as how to monitor for them. However, we know PMPs usually get a call about pests AFTER a customer has already encountered the pest in their building or landscape.



You can use the *Pest Notes* when communicating with your customers about the pest you have identified and what management solutions you intend to use. The *Pest Notes* can help your customer understand the pest, what the recommended control measures are, and what they can do (and not do) to get the pest population under control. And since UC IPM is a trusted source of unbiased information, your customers can have the confidence to know that you are doing what you and other experts in the industry know is the best tactic.

See the entire *Pest Notes* library at ipm.ucanr.edu/PMG/PESTNOTES/index.html

—Karey Windbiel-Rojas,
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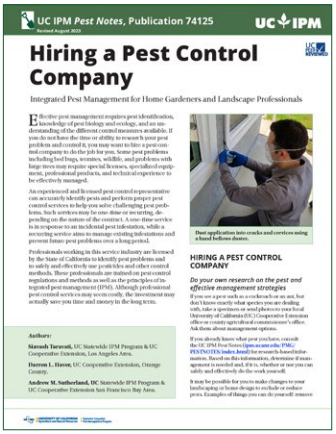
Revised *Pest Notes*



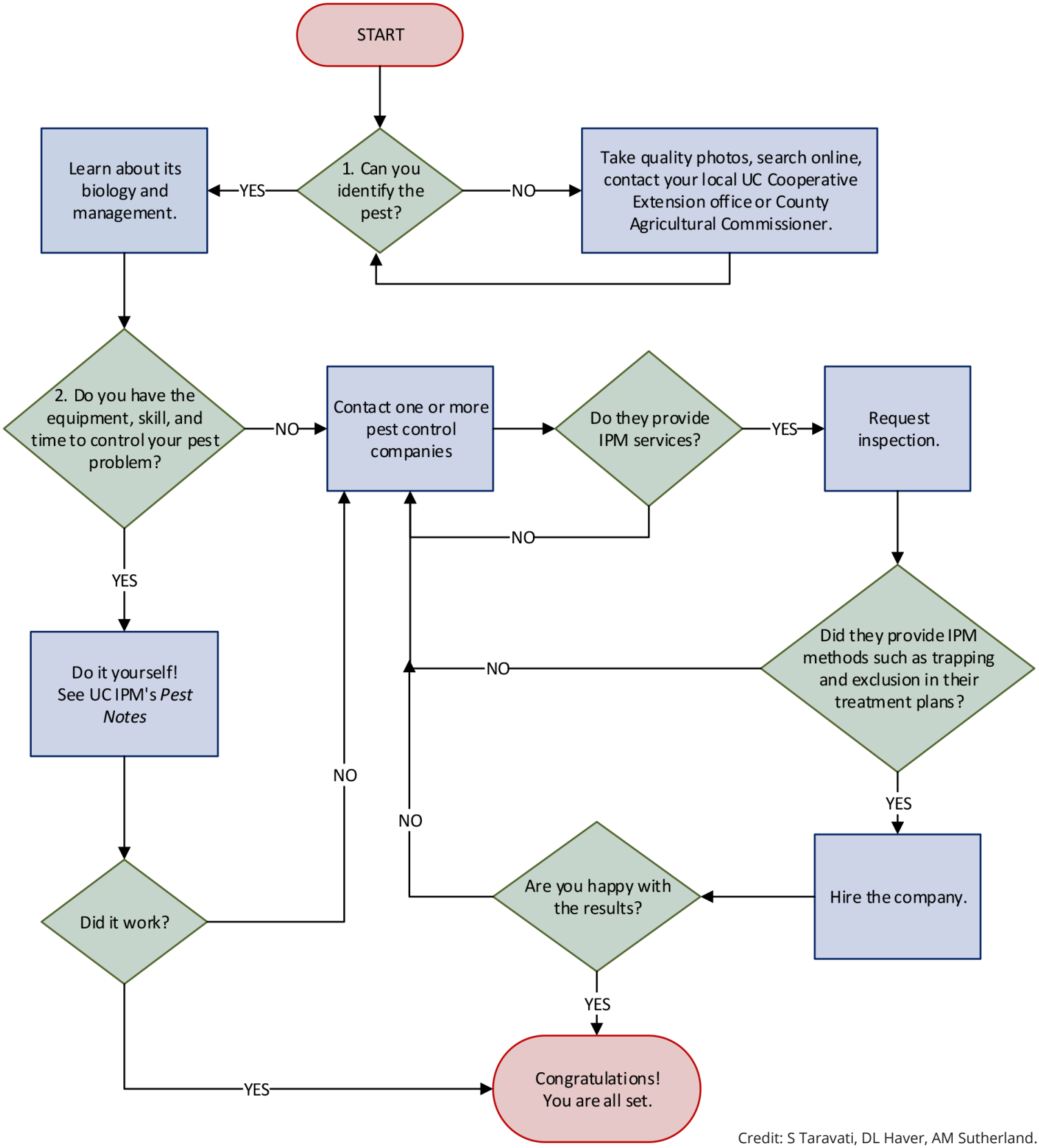
Hiring a Pest Control Company

When the general public or a business has a pest problem but they cannot or aren't sure they can handle it, hiring a pest control company may be the best approach. Deciding on the right pest control company will depend on what the client needs and what the company can provide. The recently revised *Pest Notes: Hiring a Pest Control Company*, authored by UCCE advisors Siavash Taravati, Andrew Sutherland, and Darren Haver, is a resource to help people in their decision-making process. The step-by-step flow chart is designed to walk people through what questions to ask and how to work with a company. See the flow chart on page 6 of this newsletter. We welcome you to use this free resource to communicate with your customers about the services you provide to help control their pest issues.

Online at https://ipm.ucanr.edu/PMG/PESTNOTES/pn74125.html

Flowchart for Hiring a Pest Control Company

Effective pest management requires correct pest identification, knowledge of the pest's biology and ecology, and an understanding of pest management techniques. You can encourage clients to follow this flowchart to discover the best solution for dealing with their pest problem, which can include hiring a company to provide Integrated Pest Management (IPM) service. See *Pest Notes: Hiring a Pest Control Company* for more details.



Credit: S Taravati, DL Haver, AM Sutherland.

Upcoming Meetings and Workshops (CEU opportunities)

UC Riverside Urban Pest Management Conference.

UCR Urban Pest Management Conference (UPMC) is presented by UCR urban entomology program for professionals in the pest control management industry and the public interested in urban pests.

March 26, 2024, 7:00am to 5:00pm

UCR HUB Conference Rooms, Riverside, CA

urbanpest.ucr.edu/event-list/2024/03/26/ucr-upmc-2024

Ask the Expert!

Q: In my area, subterranean termites swarm from February through April, but I've read about massive swarms after the first rains, usually near the end of the calendar year. So, do western subterranean termites swarm in BOTH spring and fall?

A: Yes, swarms of subterranean termites have been observed in both spring and fall in California. Recent research findings suggest that these different swarms actually represent different species! In fact, the western subterranean termite, *Reticulitermes hesperus*, is currently considered to be a "species complex" consisting of several species, some of which do not yet have a scientific name.

For more information, see the UC IPM *Pest Notes: Subterranean and Other Termites*.

A Sutherland, UCCE

Brood chamber of western subterranean termites on a tree.

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.