

Update

NPMA LIBRARY UPDATE

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Modern Gel Baiting Techniques for German Cockroaches

Baiting for cockroaches had become somewhat passé for our industry a few years ago with many in the industry referring to technicians as “bait jockeys” (replacing the older term “base-board” or “spray jockeys”); but resistance and aversion issues did rear their ugly heads, and since that time, every cockroach account requires treatment by what should be called a “thinking technician.” With resistance issues, one cannot simply be complacent or rely solely on baits for cockroach control. This is neither good cockroach management, nor integrated pest management (IPM) in the true sense of the term. There is nothing “integrated” about using a single bait every time you visit an account, and placing it in the exact same spot on each visit. Robotically placing the bait in this fashion whether you need it or not does nothing to “manage” the “pests.” To truly be integrated and managing the pests (in this case, German cockroaches) appropriately, we need to think about how and why the cockroaches are present in the first place. This requires a holistic approach, including a thorough inspection and use of monitors in the account involved as well as an interview of the persons who work in this environment everyday.



Adult German cockroach. (Photo credit Harvard)

Monitoring and Inspecting 101

How best do you read a monitor?

Many technicians place monitors out rather haphazardly. But a good monitor placed in an analytical fashion can provide lots of information and advice to the thinking technician. A monitor is your set of eyes while you are not present. They should be placed both high and low in an account. This may mean you are crawling under a sink housing one minute and up on a ladder near a drop ceiling the next. The monitor is there 24 hours/7 days a week, whereas, you are typically there for between 20-40 minutes in and out of a typical account. The well-placed monitor tells a story about the infestation and what you are up against, and where best to place your baits. Reading a monitor properly can tell you about the species involved, its pest biology and habits, the population size and composition, directed insect movements near harborages, and the effectiveness of pest management strategies already in place (i.e., the curled wings in German cockroaches that



This female was captured on a glue board monitor. The oothecal egg case hatched afterwards producing 28, 1st instar nymphs. Fortunately, they were also caught. (This is the value of well-placed monitors!) What else does this monitor tell you?

(Photo credit Dr. Robert Rummel)

result after using an I.G.R., or insect growth regulator, in an account).

Monitors should always be placed both high and low in the account within lines of travel for the cockroaches; these are the areas where you will encounter the pests. Because all cockroaches, and German cockroaches in specific, are thigmotactic (requiring two sides of their body be touched by a surface at all times), cockroach runways will be wherever two surfaces meet, i.e., such as a wall's baseboard and the floor, or the wall and the ceiling, or two pieces of cardboard or paper bags stacked beside a refrigerator, etc.

Monitors are placed where cockroaches will encounter them-where two surfaces meet to maximize thigmotactic behavior. Monitors can also be easily placed along utility conduits, where they encounter foraging cockroaches. Placing a monitor in these areas will maximize your trap catches. Returning to record the catch, you will learn a lot about the current population. Are the captured cockroaches all 1st instar (stage) nymphs? If so, this means you are near to a harborage with a nest site. (Adult females secrete an aggregation pheromone that keeps their young nymphs closeby to them; in fact, their first meals will often be their mother's own frass (or feces.) Is there a good distribution of many different stages of nymphs, and adults (both male and female) on the monitor? Then, it is a severe infestation and you are near to the nest site areas. Are there only adult males? Males forage a good distance from a hiding place seeking water, mates and food. You may need to look a bit further to find the real infestation.

Research has shown that adult males cannot survive greater than three days without water. So, water is a real limiting factor and knowing this, you know that placing monitors, and ultimately baits and other control measures, under sinks, faucets, dishwashing areas, mop sinks, etc. becomes very important. This idea of the need for water also plays into the fact that most baits are formulated in a gel that holds moisture for a period of time, until dried out.

The Client Interview

Walk through with the client contact/ decision-maker person (often the executive chef or sanitarian) and important custodial staff to point out and educate as to sanitation and structural deficiencies that contribute to the German cockroach infestation currently present. Ask them where they are seeing the cockroaches? When and what time of day? How many do they typically see at these times? These questions become important, because they give you a clue as to the dynamics of the population involved. (For instance, seeing cockroaches on the walls of a kitchen in broad daylight for a pest that is normally nocturnal, suggests that all available harborage areas are already taken and this individual has no place to go; you are most likely dealing with it a large infestation.)

Often times, a custodial or kitchen staff member will speak another language, such as Spanish or Thai or Vietnamese. Do you have someone on your staff that can make you a template of questions to ask in the language of the workers in the affected account? For instance, the very basics are all that are needed to assist you in getting further into the history of the infestation. ¿Dónde están las cucarachas? Which asks, in Spanish, "Where are the cockroaches?" The workers know where they are and will point them out to you! Just ask them. They will usually respond positively to being included in the process of eliminating them, and it gives them some ownership and responsibility for preventing future infestations as well. Of course, while inspecting and interviewing, you are also looking for the tell tale signs of cockroaches: the frass and the shed cast skins left as one stage metamorphoses to the next.

Know the facility in which you are working. Floor plans can be helpful to identify hidden areas you may not have

known existed but are contributing to the infestation. Become familiar with the flow of food, laundry, and other supplies into, out of, and throughout the entire facility in which you are working; for example, in a hospital setting, there are food carts which can be rolled throughout the entire building; if the wheel wells of this cart harbor German cockroaches, especially a gravid female, there are going to be problems spread throughout the entire facility. Potential things to look at in a facility include: supply flow, laundry and housekeeping materials flow, electronic and medical equipment, ventilation systems, drop ceilings and voids, plumbing and utility conduits, and food areas and cooking and dishwashing kitchen equipment.

Why bait for German cockroaches?

Baiting provides effective targeting of the pests! Female German cockroaches are often inactive and don't readily feed or drink while carrying an ootheca (egg case); (this accounts for 75 percent of their lifetime). Meanwhile, adult male German cockroaches continually forage for water, mates and food. So, the bait becomes a means of specifically targeting the German cockroach based upon its own behavior. Placing many small dabs of bait in cracks and crevices near where a female is nesting within a harborage area will kill her and her presumptive nymphs when she feeds; she is in this harborage 75 percent of the time; also, some of the active ingredient will be deposited in her frass that will be fed upon by her 1st instar nymphs and will subsequently kill them. Placing many dabs of bait in cracks and crevices near sources of water and food will kill the adult males where they will be found.

A "dab" of bait is all that is needed and is important. Many technicians choose to essentially "caulk" an area with baits. This becomes unsightly for the client, and is a waste of time and product for you. It may also necessitate going back later to clean and take it down, if asked by the client, creating extra work for the technician. Actually, placing many discrete small dabs of bait near a harborage will target the pests best. Cockroach baiting is a major tool in the IPM toolbox; because baits can be used in most areas, including computer rooms and sensitive areas, food areas, etc. (There

is no need with baits for client preparation times to remove or cover dishes or food preparation surfaces.) There are some real pluses to the use of baits, including the facts that there are no odors, they will often work in areas of clutter and little sanitation, and they are highly palatable to the cockroaches, (as long as they are moist).

Because German cockroaches are so prolific (a single mated female can have up to 48 nymphs hatch out of an oothecal egg case every 32 days or so) and can go through many generations in a short period of time, the potential for resistance (both genetic and behavioral) to insecticides applied to control them, including the baits, is very great. For the technician in this cockroach infested account, baiting and how he or she baits becomes very important, a real analytical, thinking process.

Fortunately, in the past few years, manufacturers have been able to find new bait active ingredients which work and have formulated new matrices in which to place these active ingredients. But, it is an ongoing battle to stay ahead of the potential resistance development in cockroach infestations. But, on occasion, even with your seemingly best efforts, you may still have that cockroach account that does not respond to your treatments. In this case, you may want to try a few different approaches. If you've been applying bait pastes and gels and stations alone in the account, and the *problem* still exists, then revisit the *cause of the problem* to get a lasting solu-



German cockroaches caught on sticky traps. (Photo credit Harvard)

Top 10 most common harborages for German cockroaches in an infested commercial account; (and areas around which you should use baits):

1. Corrugated cardboard
2. Sinks
3. Stove lines and the walls behind them
4. Cove moldings
5. Wall coverings
6. Food carts
7. Dishwashers and lines
8. Employee Lockers (cockroaches brought from home)
9. Ceiling tiles
10. Kitchen equipment and appliances including: refrigerators, coffee machines and industrial mixers

tion. Are cockroaches being brought into the account from deliveries or from the homes of workers? Is there a sanitation problem? Have other companies ahead of you pushed the cockroaches deeper and deeper into wall void areas by using only repellent pyrethroids? Are your baits contaminated by sprays or repelling odors? Have you maybe used a repellent spray near to a bait placement? What other issues may be contributing to the problem of lack of your baits acceptance? Concentrate on the *elimination of food, water, and harborage available to the cockroaches*.

Chemical use, no matter which chemical, will not give a good result without employing the other IPM approaches, especially sanitation and clutter removal. It becomes key to your treatment success to remove conducive conditions (dark, damp, warm conditions and harborage) and it is important to remove any competing food sources. Your baits will not be effective if there are many food deposits and residues for the German cockroaches to choose from within the account. To get the account to a place where you may come in to manage the pests regularly, an initial intensive may be required for the German cockroaches. A typical intensive will often include the following: scrape down any remaining, unsightly and non-pliable old baits with plastic putty knives, apply your I.G.R. high and low in the account, apply new gel bait throughout the account, also high and low, apply non-repellents or repellents, if appropriate, and finally, apply monitors throughout the account, also high and low. (Be sure to always follow all label instructions for any materials used.)

The tips listed to the right will help you stay ahead of resistance issues in your German cockroach accounts.



German cockroach eggcase. (Photo credit Harvard)

The tips listed to the right will help you stay ahead of resistance issues in your German cockroach accounts.

Effective Cockroach Baiting Tips:

- Wear gloves to cut down on contaminants when baiting; smokers *must* wear gloves.
- Inspect thoroughly and use monitors to establish where the colonies are located.
- Bait near the colonies; remember that German cockroaches are more often associated with water/moisture, so bait near these areas.
- A little dab will do you ... in fact, many little dabs. Place that little dab on the inside of a glue board monitor if you regularly monitor the account.
- Scrape old bait (any bait more than three months old — it will be brittle and non-pliable) out of an account; use inexpensive putty knives.
- Replace bait dabs often in high heat areas so that they remain palatable to the cockroaches.
- Use baits in conjunction with insect growth regulators and both repellent and non-repellent pyrethroids labeled for the specific account. (Some studies have suggested that IGR's may actually increase appetite in cockroaches, giving more acceptance (increased feeding) on your baits.
- Bait around drain catches.
- Bait the wheels of delivery carts, especially in hospital and nursing home settings.
- Follow-up and keep fresh bait placements in areas that are most likely to be reinfested (loading docks, delivery doors, holding areas, etc.)
- Seal bait gel tubes daily when finished using them so they do not dry out.
- Where appropriate, wash tips often to keep clear and to prevent plug-ups.
- Look for ways to incorporate baits into an overall IPM strategy for the account.
- (Don't rely solely on baits.)

To prevent aversion/resistance development issues, rotate the bait active ingredients (A.I.'s) in your account. There are many active ingredients out there: fipronil, hydramethylnon, abamectin, acetamiprid, indoxacarb, and boric acid, to name just a few, so there is no reason to use just one bait's active ingredient in an account over and over again. (In fact, this drives the mechanisms for resistance to occur in German cockroach populations much faster.)

Photo credits:

<http://calag.ucop.edu/0504OND/outrch.html>

<http://www.ext.vt.edu/pubs/entomology/444-289/444-289.html>

http://www.uos.harvard.edu/ehs/pes_germancockroach.shtml