Community IPM

American Cockroach Monitoring

Background

Monitoring is an essential part of an Integrated Pest Management program. It helps with species identification, early detection, determining movement patterns, population age, and knowing the location of pest hiding spots. Monitoring exploits the cryptic behavior of most pests, which are active when people are not around or in areas that are difficult to see. Monitors are always active and can expose the clumped distribution of pests, which are not spread evenly through an area. Keep in mind that monitoring compliments inspections, which can help to find evidence of cockroach activity and harborage such as droppings and egg cases (Figure 1).

Figure 1. American cockroach droppings have blunt ends and vertical lines that run from end to end. Piles of droppings may be found under harborage areas. Photo: M. Frye.

How To

When setting up a monitoring program, the goal is to provide complete coverage of the area by placing a sufficient number of devices. In some settings, it is possible to place monitors on a grid system; in other settings, monitors should be placed where the target pest might be active. In the case of American cockroaches, monitors should be placed at floor level in kitchens, bathrooms, boiler rooms, steam tunnels and other locations that are warm and moist. Monitors can also be placed on or inside equipment that may be attractive to cockroaches. Monitors can either be laid flat and open (Figure 2) in environments that are not accessible to children or pets, or folded over for safety reasons or better placement (Figure 3). Keep in mind that monitors should be placed in areas that are accessible to be checked, but are in dark, protected locations where cockroaches would be active. Monitors, like sticky boards, should never be left to get wet with mop water. They should be picked up before mopping and replaced afterward.

Figure 2. Monitors can be laid flat in inaccessible areas. Photo: M. Frye.

Data Collection

Monitoring is about more than presence or absence of cockroaches – it is a science that can be used to understand pest activity, and to make decisions about management. The below information is useful to record during a monitoring program.

- **Date of Capture.** To understand trends in pest activity, track your captures over time by recording the date when a trap was placed and the number of cockroaches caught.

Figure 3. Most monitors can be folded to for safety or for better placement. Unlike this device, some have glue on all sides when folded. Photo: M. Frye.

- **Location of Device.** When trying to determine the source of a pest problem, install monitors on a grid pattern or with devices evenly spread out. The location of traps should be fixed at first, so that a trap is always present in the same spot over time. In commercial pest management, use wall placards or stickers to denote the location of a specific trap at the outset of a program. For example, a wall sign with "Trap #1" would denote the location of Trap 1, which will not change. Record the location of traps on a floor plan.

  Monitoring programs do not have to remain static. Add traps to hone in on a pest harborage, and remove original devices if they are not collecting data. Record any changes to the monitoring program on the facility map so there is no confusion about the presence of new traps or the absence of old traps.
- **Number of Pests.** Record the number of pests on each device. Typically, the trap is discarded after each inspection, which resets the number of catches to zero. If the same trap will be used, note this on the monitoring log and record all cockroaches captured in each monitor.
- **Age of Pests.** Pest age can provide information about proximity to the harborage site. In the case of American cockroaches, adult (winged) cockroaches and late instar nymphs (about the size of adults, but without fully-developed wings; Figure 4) may travel far distances from the area where egg cases are deposited. However, juvenile stages tend to stay close to harborage areas. Finding these stages on a glue board indicates a nearby breeding site. Perform a thorough inspection of the surrounding area to find a constant source of food, cracks or crevices where cockroaches may be hiding, or an entry point through a drain that is either dry or uncapped.
- **Sex of Pests?** In some cases, it is helpful to know the sex of cockroaches to determine if breeding has or will occur. When turned on their back, the wings of female American cockroaches do not extend far beyond of the tip of the abdomen, and they only have two projections at the tip (Figure 5). Male American cockroaches have wings that extend further beyond the tip of the abdomen, and they have four projections from the tip (Figures 6).

Figure 4. American cockroach lifecycle. Photo: John Obermeyer, Purdue Extension Entomology.

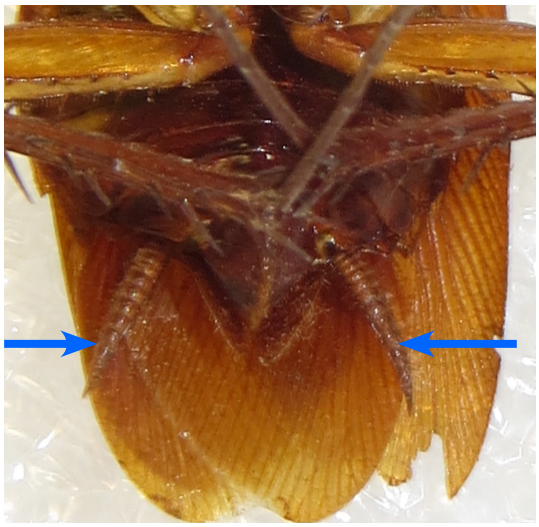

Figure 5. Abdomen of adult female American cockroach with 2 projections. Photo: M. Frye.

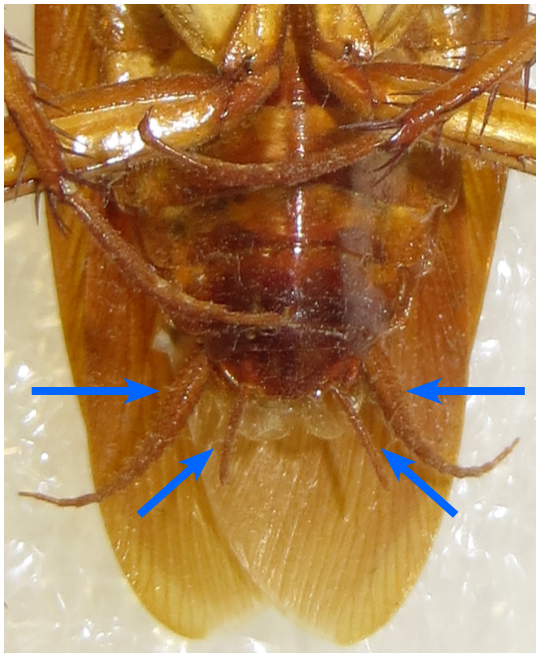

Figure 6. Abdomen of adult male American cockroach with 4 projections. Photo: M. Frye.

Interpretation

An effective monitoring program can do the following:

- **Determine proximity to hiding places:** if juvenile American cockroaches are found on monitors, then the objective is to examine the surrounding area for a food source and hiding places. This area would have many cockroaches of various life stages, as well as egg cases. It might be located in a crack or crevice, empty spaces inside equipment, or in corners. Remove live cockroaches from hiding places with a vacuum, and apply a residual pesticide to the area to kill additional cockroaches.
- **Identify entry points:** if a number of adult and late-instar cockroaches are found on monitors, this could indicate a nearby entry point to the facility. Look for uncapped pipes, drains that have dried out (no water visible in the drain), openings around utility

lines that have not been sealed, etc. Cap unused pipes, make sure drains have water (mineral oil can be used to help slow evaporation when not in use), and seal openings around utility lines.

- **Determine amount of gel bait to apply:** product labels for insecticide gel baits indicate how much bait should be used based on the cockroach population. Use monitors to determine if the infestation is "heavy" or "light", and use the suggested number and size of placements.
- **Verify treatment efficacy:** Monitor before and after a treatment to see if you have been successful in eliminating the problem. An increase in cockroach numbers sometimes happens immediately after treatment, but should drop quickly. If cockroach numbers do not continue to drop after the first week, the treatment may have failed.
- **Justify the use of more monitors:** If cockroaches are observed in a building, but are not captured on monitors (Figure 7), more monitors are needed. Additionally, if you are not able to find hiding places or entry points, more monitors might be needed to hone your inspection. Keep in mind that monitoring is an ongoing process that should be performed regularly, even in the absence of current pest activity. While numerous monitors are helpful to hone in on certain areas, fewer monitors can be used for regular monitoring after a problem has been addressed.
- **Evidence of cockroach breeding.** Some evidence for the presence of breeding cockroaches comes from a totally different group of insects. Ensign wasps (Figure 8) are parasitoids of cockroach egg cases. They may be found on a glue board or near a light source, such as a window, and indicate that cockroaches are present and breeding at the site.

Figure 7. American cockroaches may be found near drains and other entry points. Additional monitors may be needed to determine the source. Photo: M. Frye.

Figure 8. Ensign wasps are a parasitoid of cockroach egg cases. This means they lay their eggs inside the cockroach egg case, which provides food to their larvae. Photo: M. Frye.

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