PEST MANAGEMENT SOLUTIONS SINCE 1904

Old and New Foes: Creating a Cockroach Management Plan

Outside of the bed bug, there is no other insect that evokes more public disgust than the cockroach. Although cockroaches are known for their fastidious grooming, the structural infesting variety can carry foodborne illness pathogens and are a food safety concern. Cockroaches contaminate and consume our food and can be responsible for consumer complaints. In addition, and although not a problem specific to food, they can cause allergic responses in humans. The German cockroach is considered the most common trigger for asthmatic reactions in inner city children, causing illness through their secretions and shed skins deposited in infested environments. Some recent reports have hinted that certain foods, containing FDA allowable cockroach fragments, may trigger allergic reactions when consumed.

With the introduction of insecticide baits into the pest management market in the late 1980's, the challenges in controlling these pests has lessened, however, they are well known for their survival capabilities and remain a major pest of food facilities. In particular, they can be most problematic in food plants where water is used heavily for processing or cleaning. Food processors must continue to be vigilant in control efforts to maintain a zero tolerance. As with all pest management, cockroach management plans begin with identification of the species.

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Top Cockroach Species in Structures

There are two main species of cockroaches associated with food plants in the U.S., the German cockroach and the American cockroach. There are also at least four other species that are common in or around structures and at least one invasive species becoming prominent in the Southern U.S. This invasive species, the Turkestan cockroach, is displacing the more common Oriental cockroach in locations where it is found.

Cockroaches with Indoor Preferences

One way to categorize cockroaches is by their habitat preferences. Some cockroaches are primarily found indoors, while some prefer outdoors. In addition to habitat preferences, climate can impact a cockroach's tendency to be indoors or outdoors. For example, the American cockroach is found outdoors in the south, but is primarily found indoors in the north. Some of the cockroaches classified as outdoor species are also likely to invade buildings, however, they do so accidentally and may not infest the structure. The Pennsylvania Wood roach is an example of this. The males are attracted to lights and may wander into buildings, but do not establish, breed or infest inside structures. They can harbor underneath siding so may technically be on structures.

Cockroaches with Indoor Preferences

German Cockroach

The most common cockroach species in the U.S. is the German cockroach. Its small size and breeding capabilities has allowed it to become pervasive throughout the nation. This cockroach can grow to ½ inch in length, is light brown in color and has two dark stripes on the protonum, the area behind the head. The German cockroach prefers to harbor in narrow cracks and crevices, scavenging on a variety of food and often lives near sources of warmth and moisture.

German Cockroach

American Cockroach

The second most common cockroach is the American cockroach. Although it may live outdoors in warm climates, it can also become established indoors. When found in northern climates, it is often associated with sewers and enters facilities through these connections. As an adult, it is 1 ½ to 2 inches in length and is reddish brown in color. A distinct feature of the American cockroach is the pale border around its pronotum, the area behind the head.

American Cockroach

Oriental Cockroach

The oriental cockroach is another species that can be found indoors and outdoors. Similar to the American cockroach, it can establish itself indoors. This cockroach has a slightly higher tolerance for cooler temperatures compared to the American cockroach as it is associated with sewers and cool, damp locations, such as basements. The adult male and female oriental cockroaches vary greatly in their appearance. Each are about one inch in size and almost black in color. The males have short wings, covering ¾ of the body, while the females have extremely short wings.

Oriental Cockroach

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Brown-banded Cockroach

This particular cockroach, the Brown-banded cockroach is often listed in the top four most common structural cockroach species, however, it is more common in residential and institutional settings than food facilities. Similar to the German cockroach, these cockroaches prefer warmth, but are not tied to areas of moisture.

The Brown-banded cockroach is similar in size to the German cockroach, measuring ½ inch in length. It is tan to brown in color with light colored bands running the width of the body. The males can fly readily. In homes, brown-banded cockroaches are often found in living rooms and bed rooms, versus kitchens.

Brown Banded Cockroach

Cockroaches with Outdoor Preferences

The following cockroaches breed outdoors, but may occasionally find their way into structures. On occasion, some of these species can be found in large numbers on roofs, crawl spaces or underneath siding.

Pennsylvania Wood Roach

The Pennsylvania wood cockroach as its name implies, is associated with wood. In nature, it can be found in rotting logs and under loose tree bark. This cockroach will occasionally be found under wooden siding and cedar shake shingled roofs.

Pennsylvania wood roach adults are approximately one inch in size. They are dark brown in color and have a light band on the edge of the pronotum and upper wings. While the females have short wing pads, the males will fly and may be attracted to building lights. Sightings of the Pennsylvania wood roach are common in the spring months of May and June during mating season.

This cockroach will rarely infest structures indoors, but cases of accidental entry are common. There is at least one reported case of large numbers of the Pennsylvania wood roach residing in a moisture damaged roof of a food plant.

Pennsylvania Wood Roach

Asian Cockroach

The Asian cockroach was first identified in the mid-1980's in Lakeland, Fla. This species of cockroach is currently found in the following southern states: Florida, Georgia, Texas, South Carolina and Alabama. It is often associated with landscaped areas containing heavy mulch and leaf litter. The Asian cockroach is attracted to lights and flies.

Adult males and females Asian cockroaches look almost identical to the German cockroach in size and coloration. There are some minor differences including length of wings, egg capsule size and nymph size and coloration. Some of these characteristics can be difficult to distinguish and ultimately chemical analysis by gas chromatography may be required, if species identification must be confirmed.

Asian Cockroach

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Cuban Cockroach

Although not a common cockroach in the U.S., the Cuban cockroach can be found in certain geographic locations. It is an attractive insect and sometimes not recognized as a type of cockroach. Its bright green color with pale yellow border along the margins of the pronotum and wings gives it a very distinct look. Their size is approximately one inch in length with males being smaller than the females. This specie of cockroach is attracted to lights and can fly.

Cuban Cockroach

The Cuban cockroach is found in the Gulf States from Florida to Texas and has been observed in and around food plants. It is referred to as the green banana cockroach because of its association with fruits coming from the Caribbean and the high potential for this cockroach to enter a facility on incoming shipments. In one situation, the Cuban cockroach was found infesting the crawl space of a large food processor.

Turkestan Cockroach

As mentioned earlier, the Turkestan cockroach is an invasive species to the U.S. It has grown significantly in numbers in the Southwestern states, and to a lesser degree in the Southeastern states. Its point of entry or reason for its spread has not been confirmed, however, internet sales of the cockroach to reptile breeders is considered one possible explanation.

Turkestan Cockroach

Although primarily a regional pest, it can be transported to facilities outside its primary range due to commerce. It is important for food processors to be on the lookout for this pest in shipments and recognize that this pest is not common in all U.S. states.

The adult male and female Turkestan cockroaches vary greatly in appearance. The adult male Turkestan cockroach is tan and has cream colored stripes along the edges of the pronotum and wings, similar to the Pennsylvania wood roach. The adult female is dark brown in color with a pale border on the pronotum and wings. Both adults grow to approximately one inch in length, the male being slightly smaller than the female. The Turkestan cockroach is commonly found outdoors, but can be found indoors due to the adult males' attraction to lights.

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Inspection of Look A-like Cockroaches

Because some cockroaches will look-a-like, an entomologist may need to be consulted for a positive identification. Due to geographic preferences, location where the insect is found can be helpful in determining look-a-like species. See the cockroach comparison tables below to help with inspection and identification.

Species	Gender	Appearance	Geographic Locations
Turkestan Cockroach	Adult Male	About 1” in length. Tan to yellow in color with two pale bands on the sides of the pronotum and wings.	Southwestern and South eastern U.S.
Pennsylvania Wood Roach	Adult Male	Dark brown in color with pale bands on sides of wings and pronotum.	Northeastern, south eastern and Midwestern states

Species	Gender	Appearance	Geographic Locations
Turkestan Cockroach	Adult Female	1” in length, short wings with pale border	Southwestern and South eastern U.S.
Oriental Cockroach	Adult males and Females	1” in length, wings short but no pale coloration	Throughout the U.S.
Pennsylvania Wood Roach	Adult Female	Females grow to approximately ¾” wing pads cover less than 2/3rds of the body	Northeastern, south eastern and Midwestern states

Species	Gender	Appearance	Geographic Locations
Asian Cockroach	Adult Males and Females	Almost identical in appearance. Wings of males slightly longer with the Asian cockroach. Egg case not as large and they will fly.	Southeastern U.S. (Florida, Georgia, Alabama, South Carolina and Texas)
German Cockroach	Adult Males and Females	See descriptions above. German cockroaches do not fly.	Throughout the U.S.

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Prevention

There are several elements to a cockroach management program, with prevention through exclusion being key. With a goal of zero cockroaches, prevention becomes critical. Because of cockroach's diverse habits, different species may enter structures from the building perimeter, on employee belongings, through sewer connections and on shipments.

For those cockroach species residing around the perimeter, pest proofing the building will be a critical component of the program. Keeping doors and other entry points well sealed can help reduce those accidental introductions.

Exterior light management can also play a role in the cockroach management program for the light attracted species, like the Pennsylvania wood roach, Turkestan cockroach and Asian cockroach. Evaluating the lights around the structure for proper placement and type is important. It is crucial to avoid the type of lights that attract insects, like mercury vapor lighting and instead use sodium vapor lights or LED lights that match the sodium vapor light spectrum. When possible, place light on poles away from the building and direct the light onto the building instead of on the building. Some facilities use the push-pull strategy for lighting. This strategy uses insect attractive lights away from the building and less insect attractive lights on the building.

Although American cockroaches may come in from the exterior, one entry point is through the sewer system. In urban areas, the sewer system can serve as a common highway for the American cockroach. One exclusionary tactic is sealing drains not used in water management. There are also one way valves on the market, which will allow water to flow down a drain but will prevent insect entry out of the drain. These valves are inserted directly down into a drain pipe and are available in a variety of sizes to fit standard sized pipes. Another exclusionary tactic most commonly used by food plants is using screens or drain socks made of flexible screening material on drains to prevent cockroaches from entering.

Most food processors have experienced at least one introduction of the German cockroach into their facility on the personal belongings of a worker. The infestation will typically start in a break room or locker room where cockroaches are carried on a lunch container or bag. A cockroach monitoring program and regularly scheduled employee locker inspections are essential for early detection. Employees must also follow food plant policies regarding the placement of personal items in designated areas only.

The last route of entry to be addressed are the incoming shipments. This includes raw ingredients as well as materials brought into vending and food service areas. Staff should be trained regarding the identification and associated signs of cockroaches. Species with outdoor and indoor preferred habitats can make their way into structures through product deliveries. Cockroaches may even be brought into staff support areas like offices or public reception areas on flowers and plants. Specimen samples for identification should be retained for positive identification by an expert as needed.

Incoming Shipments
Staff should be trained regarding the identification and associated signs of cockroaches

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Monitoring

Monitoring devices can help determine if the exclusionary practices in place are successful. A successful monitoring program will utilize both visual inspections and monitoring devices. The most common device used for monitoring cockroaches is the sticky trap. These are typically a hard stock paper with glue and may not be suitable for all areas within a food plant, especially where they may be exposed to heavy quantities of water or dust. Where these devices are not suitable, visual inspections can be used alone. Some of the exterior invading cockroaches that are attracted to light can be captured with insect light traps. Their presence in these traps can indicate a weakness in exclusionary defenses.

Monitoring Devices
Monitoring devices can help determine if the exclusionary practices in place are successful

Control Tools

If preventative methods fail to exclude cockroaches, additional control efforts will be required. This can encompass tools varying from non-chemical tools, such as vacuums to chemical tools like insecticides. Typically, a combination of tools are used for best results.

Two of the most important post exclusion non-insecticidal strategies are improved sanitation to eliminate readily available food and the elimination of cockroach harborages through the use of sealants or other structural modifications. When controlling German cockroaches, sealing cracks and crevices to eliminate protective harborages is of value and perhaps even more important than removal of food since they will feed on almost anything. However, sanitation does play a role in making food less available and removing materials like oils which might compromise insecticide activity.

Gel Baits
Gel baits have the advantage of allowing many small placements, which is ideal for pests like the German cockroach

The primary chemical tool used for the indoor cockroach species is cockroach bait. There are different types of cockroach baits, one being gel bait. Gel baits have the advantage of allowing many small placements, which is ideal for pests like the German cockroach. Other forms of baits such as granular formulations may be used for larger cockroaches.

Historically, German cockroaches have developed an aversion to the gel bait. Bait aversion occurs when certain sugars, used as feeding attractants, are no longer accepted by a cockroach population. The bait manufacturers respond to this aversion issue by changing the type of sugars used in formulating their baits. More recently, resistance has appeared where cockroaches feed on the bait but are less likely to be killed by the baits active ingredient or toxicant. Good baiting practices, including the rotation of baits from one insecticide class to another can be helpful in preventing resistance. If overtime, formerly effective baits no longer provide sufficient control, rotating to another active bait ingredient or the use of other chemical methods will be required.

About McCloud Services

Founded in 1904, McCloud Services is a leader in integrated pest management solutions. Dedicated to providing the highest level of pest management services and customer care, the company's programs are designed to target immediate pest concerns with the least possible threat to people, property and the environment. McCloud Services embraces the latest technology innovations and remains at the forefront of the pest management industry. The company's mission is to protect its customer's health, property, food, and the environment while providing the highest level of safety for its employees and the general public. McCloud Services is a regional service provider with locations in Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri, Ohio, Tennessee and Wisconsin.

About The Author

Patricia Hottel is technical director at McCloud Services and has over 35 years of pest management industry experience. Hottel is a board certified entomologist and a member of the National Pest Management Association's Commercial and Fumigation Committees. She is also a former member of the board of directors of the National Pest Management Association (NPMA) and the Illinois Pest Control Association (IPCA). She has served on the board of directors for the professional pest management fraternity, Pi Chi Omega, is a past chair and current member of the Copesan Technical Committee, is a past chair of NPMA's exam review board, and the NPMA Technical Committee. Hottel holds a bachelor's degree in entomology from the University of Georgia and a master's degree in instructional technology from the University of Central Missouri.

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