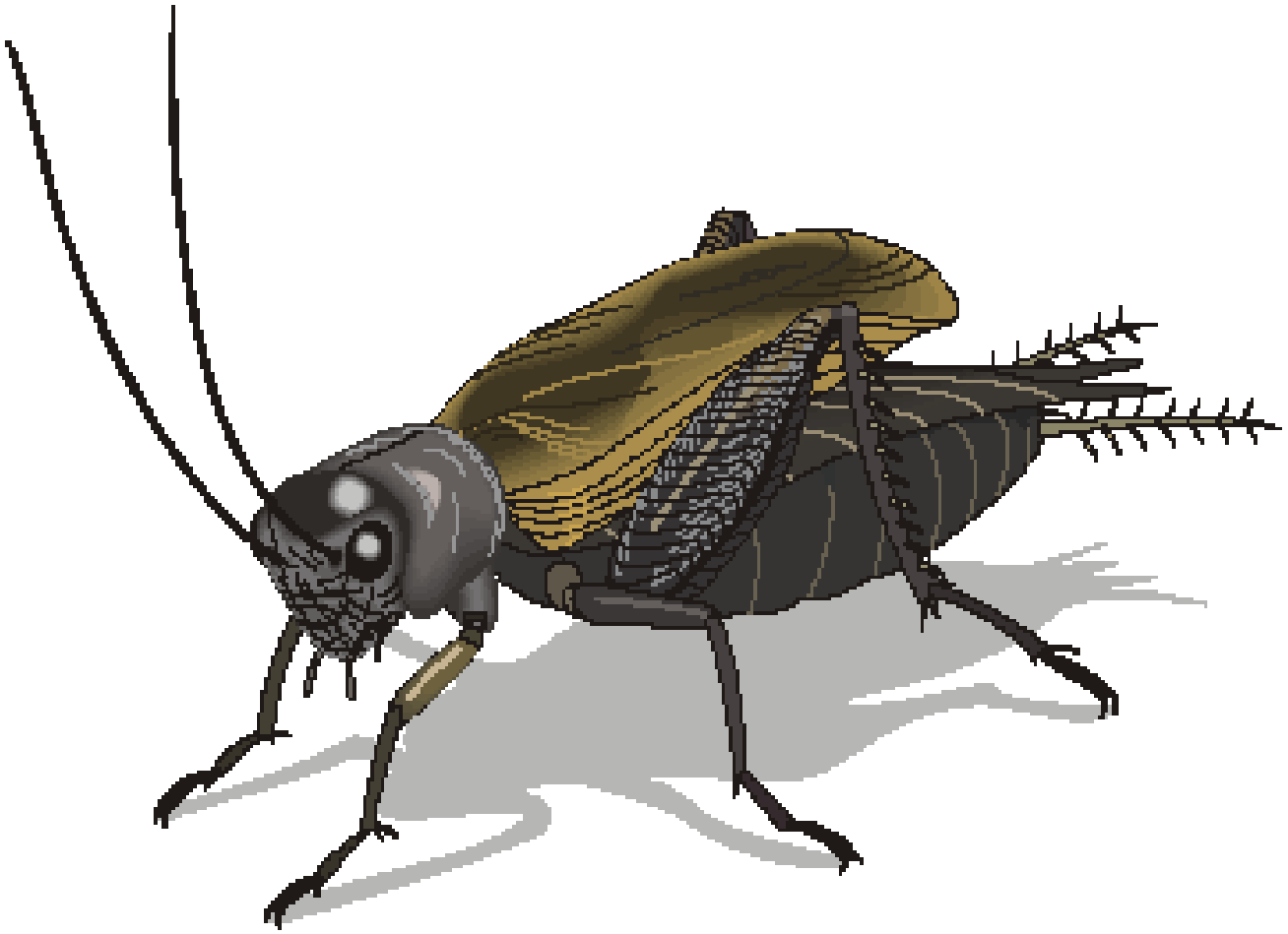
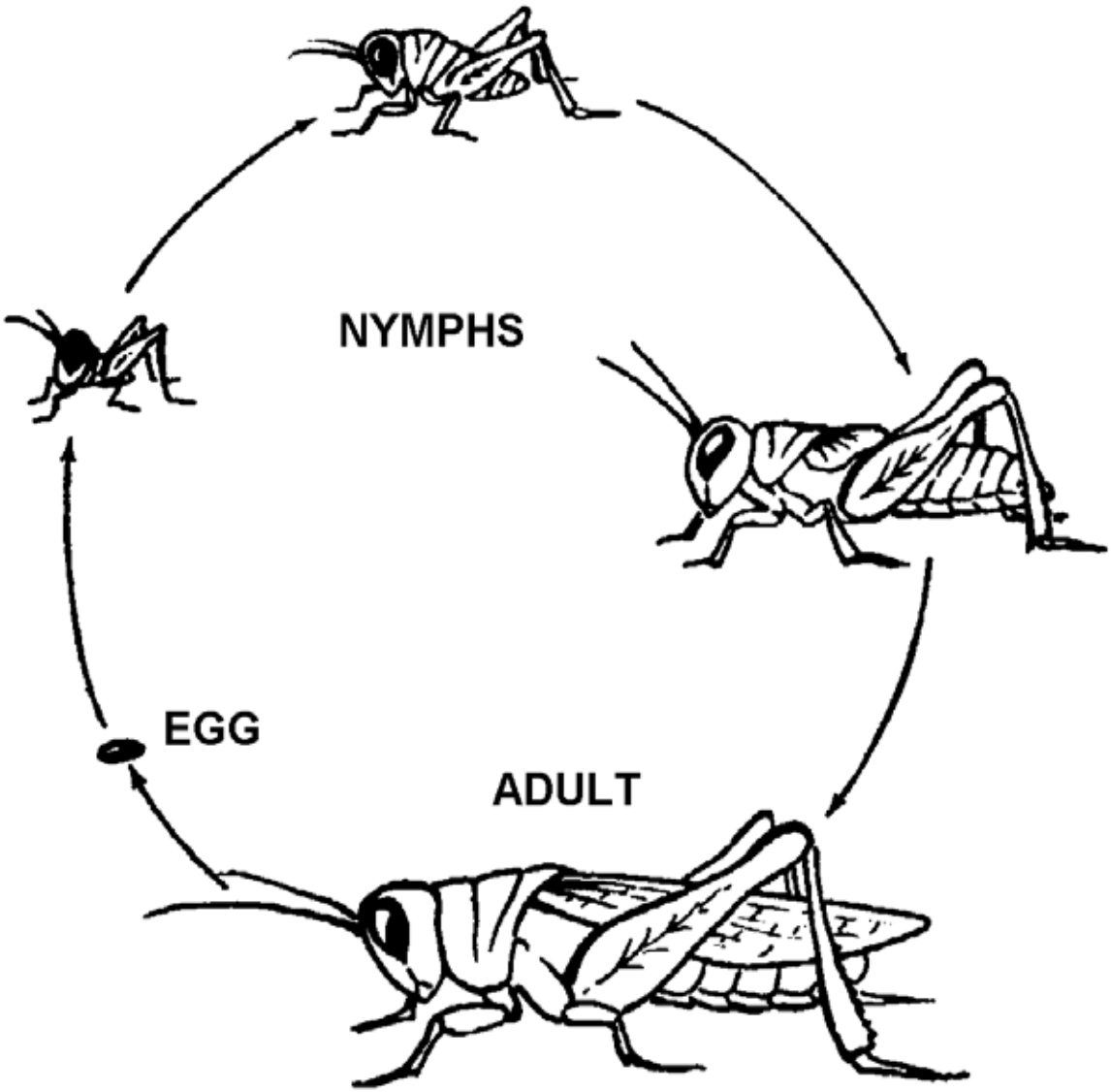
CHAPTER 30
THE BEST CONTROL FOR CRICKETS



GRADUAL METAMORPHOSIS OF A CRICKET



Like cockroaches, crickets and grasshoppers have chewing mouthparts and can feed on practically anything.

CRICKETS
Order - Orthoptera
Family - Gryllidae

Crickets are usually just noisy nuisances in buildings but, they may also damage fabric or other materials. They are nocturnal and prefer warmer conditions. They love beer just like cockroaches. They are especially destructive to silks and woolens, and, like carpet beetles and clothes moths, they are attracted to perspiration and other stains on soiled clothing and fabrics. Occasionally, crickets invade a structure in large numbers. They are often attracted to lights around a building at night. Besides the fabric damage they may cause, they produce a chirping sound which may, after a period of time, become annoying to building inhabitants. In Asian countries, male crickets have been kept as pets for centuries and revered for the soothing love songs they create with the stridulating organs on their wings. (Count the number of chirps in 15 seconds and add 40 to determine the temperature in Fahrenheit degrees.) **Carefully seal and caulk cracks and crevices around windows and doors and in the foundation. Indoors: Remove crickets by vacuuming.** House lights attract both field and house crickets. **Keep garbage cans clean and covered; empty them frequently.** Keep firewood at least 1 to 2 feet away from the foundation. Apply a 6" band of ashes or lime around the wood pile. Eliminate sources of moisture by fixing leaky pipes and modifying damp areas. Use these creatures for fish bait or freeze them and use them to find carpenter ants nests. Attract them to traps/baits with peanut butter and/or beer.

Crickets belong to the insect order Orthoptera and are related to grasshoppers and katydids. Like katydids, male crickets "sing" in the summer by moving hard parts of their wings together; the males are calling females for mating. They develop with gradual/simple metamorphosis; during some periods, adults and nymphs share the same harborage and food with grasshoppers. These insects do not undergo a complete metamorphosis, therefore the young resemble adults except they do not have functional wings. Young and adults both have similar feeding habits. The most common crickets to invade buildings include the house cricket, and the field cricket, which are very similar in appearance. A more recent cricket pest, found in California and Arizona, is the Indian house cricket.

House cricket adults range in length between 1/2" and 7/8". They may be light yellowish brown, with three dark bands on the head, or solid shiny black. This species has long, slender antennae. The field cricket is slightly larger, up to 1 inch in length, and usually brown or black. Females of both species have a long, thin ovipositor projecting from the tip of their abdomens.

Overall Control Guidelines for Crickets - Other than negative ion plates or purple plates which repel crickets naturally, the key to managing crickets ("the noisy cockroach") in buildings is exclusion. Be sure all doors, windows and screens fit tightly. Cracks and other openings from the outside (especially near ground level) that provide access into the building should be sealed. Also, caulk or otherwise seal cracks and crevices inside the building that provide hiding places. Use a strong vacuum or roach sticky traps or duct tape placed sticky-side up or boric acid baits to control areas, e.g., behind or under heavy furniture and appliances or in other inaccessible areas. Weeds and debris around the outside of the building should be closely mowed and/or removed to eliminate their normal habitats. Change outside lighting to sodium vapor lights or yellow incandescent lights that are less attractive to crickets (and other insects). Remove feeding and breeding sites outside. Garbage and other refuse that serves as food should be properly stored in containers with tight lids and elevated off the ground on platforms or bricks.

Cricket infestations are usually seasonal. Most often problems occur during the fall as evenings become cooler and the insects seek to enter your building for warmth and shelter. Because of this, vacuuming or applications of diluted Safe Solutions, Inc. Enzyme Cleaner with Peppermint or baits containing sodium borates or aspartame or food-grade DE are all that is needed indoors for adequate control. Crickets require a steady supply of fresh water and will drown easily in a shallow dish trying to reach a few pieces of dry dog food put in a shot glass in the middle of the saucer. Grasshoppers can be controlled outside with semaspore baits which spread an infection from which they cannot recover. One especially good boric acid bait that can be used inside and out is NiBAN Granular Bait®, a weather-resistant bait for the control of crickets and cockroaches, its active ingredient is Ortho Boric Acid - 5%. For the control of mole crickets on lawns, ornamental turf, playing fields, parks, fairways and greens of golf courses: Use a mechanical spreader to apply bait evenly to affected area at the rate of 2 pounds

per 1000 square feet (3.2 ounces per 100 square feet) or 90 pounds per acre. Areas to be treated should be well irrigated prior to application and product applied late in the afternoon. For maximum effectiveness, do not irrigate treated area immediately after application. For the control of crickets in and around homes, hotels, apartment buildings, stored and restaurants (non-food areas), warehouses and sewers: Apply at the rate of 4 pounds per 1000 square feet (6 ounces per 100 square feet) of surface area. Spread evenly in crawl spaces, attics, drop ceilings, cellars with dirt or gravel floors. In warehouses, garages and basements, concentrate application along walls and baseboards. Apply in inaccessible areas such as cracks and crevices where insects may hide. Bait may also be placed in removable trays. Locate trays in areas accessible to insects but away from children and pets. Always record the location and number of bait stations. In sewers, apply along ledges and around manhole entrances. Bait exterior perimeter areas of buildings in a band at least 2 feet wide and scatter bait in flower beds, leaf litter, wood piles, trash cans and refuse areas. You can also make your own bait with corn meal and (1% - 5%) sodium borate or aspartame. Try spraying diluted Safe Solutions Enzyme Cleaners with Peppermint and/or borax or Not Nice to Bugs® directly on the problem area/bait/pest. Be careful not to contaminate anything with borax or sodium borate. Remember that we have quickly and safely controlled crickets in the lab and field with diluted Safe Solutions Enzyme Cleaner with Peppermint. You can also steam clean/kill them. Lightly dust with food-grade DE.

GENERAL DESCRIPTION
CRICKETS

ORDER - Orthoptera

FAMILIES - Gryllidae (ground, field, tree and house crickets) and Gryllacrididae (camel crickets) and Gryllotalpidae (mole cricket) and Stenopelmatidae (Jerusalem cricket).

TYPE METAMORPHOSIS - Gradual/simple

Egg - Normally eggs are laid singly in crevices in dark places, behind baseboards, etc.

Nymph - Resembles adult in appearance but smaller in size and wingless. May have as many as 10 instars before becoming on adult.

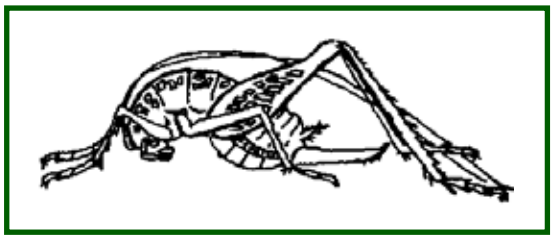
Adult - Fertile males and females.

TYPE MOUTHPARTS - Biting and chewing.

DESCRIPTION - A noisy cockroach with long hind legs which allow them to jump.

SPECIFIC EXAMPLES

CAMEL CRICKET
Also known as Cave or Cellar Crickets
Genus- *Ceuthophilus spp.* and *Tachycines asynamorous* (Adelung) or Grennhouse Stone Cricket



This humpbacked insect ½”- 1½” is more closely related to katydids than to crickets. It is mottled brown and wingless with very long legs and antennae. Cave crickets are often compared to spiders, but the resemblance is only superficial. Cave crickets prefer dark damp or cool places like basements, crawl spaces, and garages. They seldom cause damage. The female’s ovipositor often is longer than half of its entire body length.

Inspection

- Locate the egg laying sites where populations build up, if possible.
- Look near patches of weeds, soil cracks, at the base of plants, or in grass.
- Inspect basements, closets, pantries, and attics.

Habitat Alteration

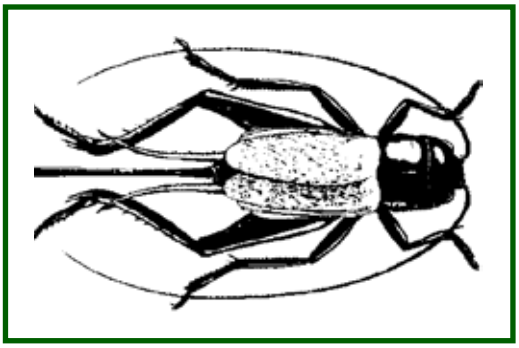
- Practice proper sanitation.
- Install doorsweeps, caulk, tighten and weather-strip basement and ground floor doors and windows to keep crickets out.
- Thin plantings next to building foundations. Lightly dust with food-grade DE or spray the foundation with cedar oil or diluted Safe Solutions Enzyme Cleaner with Peppermint.
- Keep grass short during cricket activity to discourage the insects and reduce cover.
- Ventilate and remove materials that provide hiding places for cave crickets in crawl spaces and garages.

Intelligent Pest Management® Control

- Properly install and maintain a dehumidifier, air conditioner and/or vents and fans. Reduce or eliminate all moist harborages. Lightly sprinkle Comet®, baking soda, talcum or medicated body powder or food-grade DE.
- Seal/caulk/screen all cracks and crevices near the foundation and around door stoops and patios. Routinely spray and/or clean with Safe Solutions Enzyme Cleaner with Peppermint.
- Vacuum up the invaders inside and outside around the building if populations are very high.
- You may use granular baits when needed as a last resort. Try corn meal with 1% - 5% sodium borate. (Put sodium borate or aspartame enzymes on wet to the cornmeal and then allow to air dry.)
- Where very high build-up is detected in breeding areas, particularly in a series of cricket invasion years, closely mow the weeds and grass in midsummer.
- Steam clean. Lightly dust with food-grade DE (If you see white it is not right.).
- Simply step on or vacuum or swat field and cave crickets indoors.
- Use dehumidifiers and/or vents and/or fans in crawl spaces, basement and garages.

Adult - 1/2" - 1-1/4" long, hump-backed, wingless, long antennae, dark brown colored. Prefer to live in dark, damp places. Look under porches in soil, under logs and stones and watch out for your fabrics; they may be vectors of disease.

FIELD CRICKET
***Gryllus spp.* , e.g*., G. assimilis* (F)**



The most commonly-seen crickets in the United States are field crickets; adults are very dark and 1/2"- 1-1/8" long. Eggs are laid toward the end of summer in moist soil of roadside ditches, meadows and fields, along fences; and in dry weather, they are laid in soil cracks, where adult crickets find some moisture for egg laying as well as for themselves. Eggs are injected into soil by the female using a long, straight appendage called an ovipositor. The eggs overwinter and hatch in spring. The antennae are thread like and longer than the body.

Crickets feed on plants, and mature in July and August. When weeds begin to harden and die and rain is sparse, crickets often leave their ditches and fields; they move out in massive invasions. This is the time they come into homes and buildings. Entry into structures is most always under doors and through opened windows. Vacuum all visible crickets. Crickets quickly die in seconds when sprayed with Safe Solutions, Inc. Enzyme Cleaner with Peppermint.

Field cricket populations are cyclical. Some years great numbers find their way across parking lots and into malls and office buildings. Many years of low cricket populations may follow. Other crickets like the house cricket, and the very small dark brown Nemobius, also have cycles of build up and movement into structures.

Adult - 1/2" - 1-1/8" long, yellowish to dark brown to blackish in color, bottom wings often extended past the end of the top wings like pointed tails. They chirp and sing night and day. They damage alfalfa and grain products, especially while in the field. They feed on soil but also eat one another and other insects. **They are attracted to lights**. In a building they will attack cotton, linen, wool, silk, leather, rubber, nylon, wood, plastic, furs, paper,

etc., especially if stained or dirty. They prefer to live outdoors and feed on soft plants, but will come inside if there is excess rain, heat or cold. They are attracted to lighted areas at night, so turn them off when crickets become numerous outside.

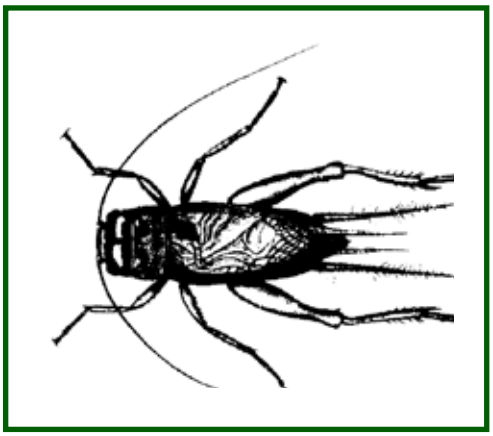
Intelligent Pest Management®

Control - Practice proper sanitation. Routinely mow lawns, eliminate all moist harborage sites, remove wood piles, change outdoor lighting to yellow bulbs and/or sodium vapor, caulk, seal and screen off all possible points of entry, vacuum up all visible pests. Routinely spray and clean with diluted Safe Solutions, Inc. Enzyme Cleaners. Lightly dust with food-grade DE.

GROUND CRICKETS
***Nemobius fasciatus* and other species**

Adult - Usually less than 1/2" long; may become a pest around homes after harvest or hay cutting.

HOUSE CRICKET
***Acheta domesticus* (Linnaeus)**



Adult - Approximately 1/2" to 7/8" long, average 3/4" long, light yellowish-brown, to gray and brown in color with three dark crossbands on the head, and long threadlike antennae longer than the body. The female is larger with a single-spike tail or a long, thin ovipositor used to deposit soft-shelled eggs in the soil - the eggs usually hatch in 7 days. They prefer warm hiding areas. They can fly readily and are often attracted to light. Normally live outside when it is warm; then they migrate inside during cold weather approaches. Nocturnal; only active when warm and they can bite. They mature in 35 days. They are omnivorous, eating or drinking virtually anything that is available, e.g., silk, woolens, paper, fruit, vegetables, and in a real pinch they are cannibalistic. The wings lie flat on the back with the sides folded around the body. Only males produce the shrill, chirping noise by rubbing the serrated edges of the fore-wings against each other. Females *hear* the sound through auditory organs located on the front pair of her legs. They prefer to feed on soft foods, e.g., vegetables, meat, bread and dough. They have biting mouthparts and a pair of long, slightly curved cerci at the end of the abdomen. Originally from hot deserts, they are not active in cold conditions, nor can they survive much more than a week without food. They can damage textiles, leather, wood and foodstuffs. See IPM control - Vacuum up all visible pests, etc.; reduce or eliminate all moist harborages; seal off all possible entry points; vent and/or use a dehumidifier; change lighting; spray and clean routinely with diluted Safe Solutions Enzyme Cleaner with Peppermint and/or borax.

JERUSALEM OR STONE CRICKET
***Stenopelmtus fuscus* (Haldeman)**

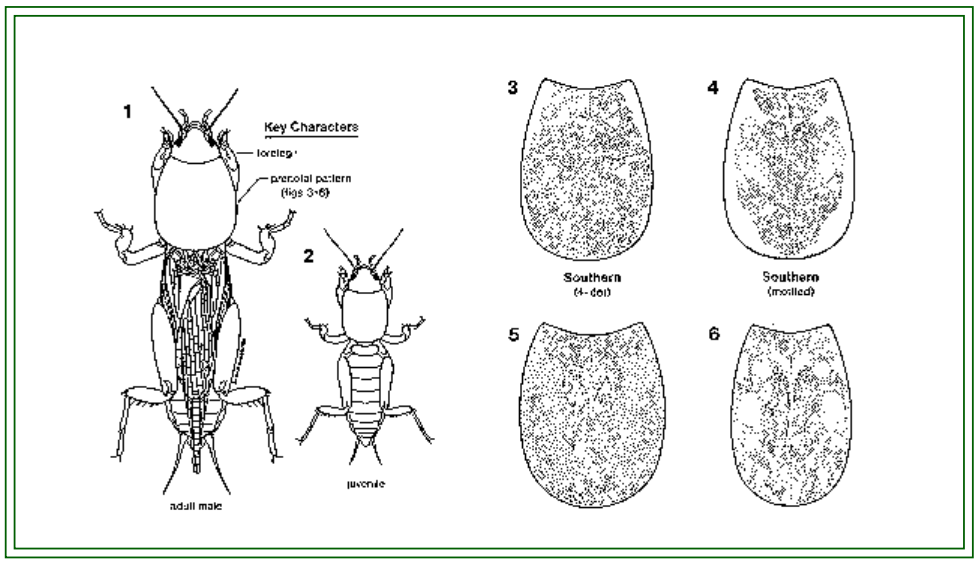
Adult - Wingless with a large head; they are large, about 2" space long, distinctly colored crickets with a heavy body, that can bite with ferocity. Not normally a pest of buildings. Color can range from brown to yellow-brown with wide blackish bands across the abdomen. They are nocturnal and subterranean and little is known about their biology. Remove with a vacuum or spray with diluted Safe Solutions, Inc. Enzyme Cleaners.

MOLE CRICKET - In 1940 the USDA applied nearly 1300 tons of arsenic in Florida to try to control this pest.

<u>INTRODUCTION</u>: Mole crickets are large, near cylindrical crickets with mole-like digging forelimbs. The adults have wings, and many are powerful, though clumsy, fliers. Mole crickets are most often seen when they end their

flights at lights (or in swimming pools, where they swim rapidly on the surface, buoyed up by their short, dense, unwettable pile). Otherwise mole crickets remain in tunnel systems in the soil, their presence revealed chiefly by long tracks of pushed up soil associated with their tunneling just beneath the surface. Three of the 4 species of mole crickets occurring in southeastern United States were accidentally introduced from South America and belong to the genus *Scapteriscus*. The fourth is the northern mole cricket, *_Neocurtilla hexadctyla* (Perty), a native species; it was earlier known as *Gryllotalpa hexadactyla* (Perty) and *Gryllotalopa borealis* (Burmeister).

DISTRIBUTION: The northern mole cricket occurs throughout all but northernmost eastern United States and the Florida Keys. The 3 species of *Scapteriscus* were first introduced into the United States around 1900. Their source was almost certainly temperate South America, where Buenos Aires and Montevideo were the principal ports. The manner of introduction is unknown, but the dumping of ballast may have been responsible in some instances.



The Tawny mole cricket *Scapteriscus vicinus* (Scudder) was first recorded in 1899, at Brunswick, Georgia. It slowly spread, completing its occupation of Florida by 1960. Since that time it has continued westward to Mobile, Alabama. Its ultimate U.S. range is uncertain. The Southern mole cricket, *Scapteriscus acletus* (Rehn & Hebard) and the Short-Winged mole cricket, *Scapteriscus abbreviatus* (Scudder).

Bahiagrass, Bermudagrass and Centipede grass are most severely damaged. St. Augustine grass is also damaged somewhat by mole crickets. Most mole cricket feeding occurs at night during warm weather, after rain showers or irrigation. All nymphal stages as well as adults come to the surface at night to search for food. Tunneling of more than 20 feet per night has been observed. During the day the mole crickets return to their permanent burrows and may remain there for long periods of time when weather conditions are unfavorable. Adult mole crickets are strongly attracted to lights during their spring dispersal flights. **Attract and kill them!**

INSPECTING FOR MOLE CRICKETS - Soap flush in an effective method for surveying mole cricket population, especially in the late spring and early summer when the crickets are small and tunneling activity is not readily evident. Mix 1½ fluid ounces of any liquid dishwashing soap or Safe Solutions Enzyme Cleaner in 2 gallons of water and apply with a sprinkling can to 4 square feet of turf in several areas. If an average of two to four mole crickets appear on the surface within 3 minutes, then an overall treatment is probably needed.

LIFE CYCLE: The seasonal life cycles of Southern mole crickets are imperfectly known, and those of introduced species may have yet to complete their adjustment to the climates of recently invaded areas. A male mole cricket burrows into the ground to build a chamber that will amplify its mating call.

Northern mole crickets apparently take 2 years to develop in most of their range but in northern Florida have a 1-year life cycle similar to those of the Tawny and Southern mole crickets. The latter 2 species lay eggs (in

underground cells) in the spring, juveniles develop mostly during the summer months, and large juveniles and new adults overwinter. Overwintering juveniles mature in time to participate in late spring egg laying. Flights of Tawny and Southern mole crickets help them find mates and new areas to colonize. The largest flights are generally in the spring with fall flights being smaller and more variable. In southern Florida, but not elsewhere in the state, large flights of Southern mole crickets occur in midsummer, suggesting a 2-generation life cycle. The Short-Winged mole cricket occurs in all stages at all times of year.

ECONOMIC IMPORTANCE: They cause an estimated $75 million in damage every year in the southern USA. Younger stages of mole crickets damage lawns, sod farms, parks, golf course, and pastures, sometimes even necessitating replanting. They also destroy seedlings of vegetables, e.g., tomato, cabbage, eggplant and bell pepper and tobacco. Damage is due both to feeding and tunneling, but little is known of the relative importance of these 2 modes under particular circumstances. The annual dollar cost of mole crickets in the Southeast is surely in the tens of millions — as suggested by the approximately 146 tons of active (poison) ingredients (costing $11.7 million) applied just for insecticidal control of mole crickets in just Florida in 1980.

The 4 species are obviously not of equal importance. The Tawny mole cricket feeds principally on plant material and can destroy well-established grass. The Short-Winged mole cricket has a diet similar and is often associated with damaged turf; however, its limited geographical distribution and low mobility reduce its impact. The Southern mole cricket feeds chiefly on animal matter and apparently has little effect on established grass. The Northern mole cricket is least damaging, perhaps because it occurs in lower numbers and usually in moisture saturated soils near lakes, ponds and streams.

SURVEY AND DETECTION: Mole crickets generally reveal their presence by surface tunneling, but tunnels of small juveniles are inconspicuous and nearly formless. Once detected, mole crickets must be flushed from the soil if they are to be identified as to species. Liquid dishwashing soaps at 1-1½ fluid ounces per gallon of water are cheap, available flushing materials. The mixture is applied with a garden sprinkler can at a rate of 1 quart per square foot and the treated areas watched for emerging mole crickets for several minutes.

Flying mole crickets can also be sampled at lights, but the most productive technique is to broadcast loud, stimulated calling songs above a trapping device. Hundreds or even thousands can sometimes be collected during the flight period (starting 20 min. after sunset and ending about an hour later.)

INTELLIGENT PEST MANAGEMENT® CONTROL: Since most pest mole crickets are introduced and are neither abundant nor damaging in their own homelands, the prospects for biological control through importation of natural enemies are good. One natural enemy, *Larra bicolor* (Fabricius), a sphecoid wasp, was introduced in 1981 and is established at Fort Lauderdale. It is still too early to judge its effect on mole cricket populations, but because its homeland is tropical Brazil, it probably cannot overwinter in all of the regions infested by *Scapteriscus*. Efforts are presently under way to identify natural enemies of *Scapteriscus* in Uruguay and Argentina for possible importation as biological controls.

Safe Solutions, Inc. Enzyme Cleaner with Peppermint drenches or sprays are very effective but temporary. Getting the diluted sprays or drenches to the mole crickets is difficult, sometimes making 5% or less boric acid or food-grade DE or 3% or less DOT or aspartame baits, including applicator-formulated ones (3), more cost-effective than drenches. Timing of drenching application is crucial. The best time is generally when adults have ceased flying and their young are still small (in many areas, early summer).

Natural and Biological Control - Southern mole crickets are very cannibalistic and a high percentage of nymphs, especially instars, may be lost in this manner. Young nymphs will devour each other and the unhatched eggs. When mole crickets come to the soil surface they are subject to numerous naturally occurring predators, including fire ants, ground beetles, Labidura earwigs, and Lycosa spiders. Larger animals including raccoons, skunks, red foxes, and armadillos also feed on mole crickets, but often these *big boys* also damage lawns when searching for crickets.

Parasitic nematodes *Steinernema spp.,* e.g., *Steinernema scapterisci* are now commercially available for mole cricket control. They are sold under the trade names of Proactant Ss and Vector MC. These natural enemies are specific enemies of mole crickets and are harmless to non-target organisms. Entomopathogenic nematodes, e.g., *Heterorhabditis megidis* and *Steinernema feltiae* are also effective biological controls. A protozoan pathogen,

Nosema locustae, has been successfully used to control both crickets and grasshoppers. *Larra bicolor* is a wasp native to South America. Adult female wasps attack mole crickets and lay an egg on its underside; 6 to 8 days later the egg hatches and the larva attaches its mouthparts onto the cricket and feeds like a blood sucker or lamprey eel for 7 - 9 days until the cricket is dead. The larva is now fully grown, spins a web and pupates in the ground until it emerges as a adult (several weeks or months later, depending on the temperature). The red-eyed Brazilian fly, *Ormia depleta* (Weidermann), a parasitoid fly, imported from South America is also a parasite of mole crickets. Laboratory and quarantine work is continuing with other natural enemies including fungal pathogens, e.g., *Beauveria bassiana* and *Metarhizium anisopliae* and *Metarhizium flavoride,* a predatory larva of a beetle and a pathogenic virus, all from South America. Put a stick of Juicy Fruit or sprinkle talcum powder or finely ground calcium carbonate (Comet®) or power dust food-grade DE into the tunnels.

Cultural Control - Try to encourage a deep, healthy root system which is more tolerant to soil inhabiting insects such as mole crickets, white grubs and billbugs, proper and regular mowing, irrigation and organic fertilization practices are especially important. Do not mow shorter than recommended. Keep mower blade sharp. Don't allow turf to dry out excessively. When irrigation is required, apply 3/4" water. Do not irrigate again until grass begins to wilt. This encourages deep root growth. Fertilize according to a proper organic soil test for your particular grass type. It is important to maintain optimum levels of potassium and minor nutrients as well as pH. The fungi, *Beauveria bassiana,* can be aplied sub-surface to kill these pests.

Chemical Control - Use diluted Safe Solutions, Inc. Enzyme Cleaner with Peppermint and sodium borate. Soak until the liquid drench reaches at least the plant root zone. Don't fertilize this area for 2 weeks before and after an enzyme application. Lightly dust with food-grade DE.

TREE CRICKETS
***Oecanthus fultoni* and other species**

Adult - Size varies but adult chirping can be used to approximate the temperature in degrees Fahrenheit by adding 40 to the number of chirps made in 15 seconds. They only damage plants by making holes in the stems and branches when they lay eggs. Not found inside of buildings.

CRICKET GENERAL DESCRIPTION CONTINUED

LENGTH OF LIFE CYCLE - About one generation a year; most overwinter in the egg state.

HABITAT - Lives in any dark, damp, slightly warm area of a structure in crawl areas, grass and trees. They are generally nocturnal insects - so install lights, fans, vents and/or dehumidifiers or air conditioning.

NATURE OF CRICKET INJURY - Crickets are omnivorous, eating practically anything they can chew including one another, beer, peanut butter, fruits and vegetables, plants, grasses, seeds, silk, clothes, rugs, wood, nylon and rayon. The damage done to fabrics is similar to cockroach damage. They can also become a noisy nuisance. The chirping sound is produced by scraping the file-like surface under the wing over the veins on the top of the other wing. The males love to fight each other and they love beer, so make some beer/aspartame baits.

HARBORAGE - Prefer dark, moist, warm places, basements, flower beds, along foundation walls, in crawl spaces, under porches, logs, stones, in closets, etc. At night they forage out and may invade buildings, getting into dark corners, cracks, crevices, closets, under rugs and furniture.

During certain times of the year mating flights of crickets occur and thousands of crickets can fly into your yard and invade poorly screened/caulked/sealed buildings. In very large numbers they may make an area not only unattractive but potentially dangerous.

INTELLIGENT PEST MANAGEMENT® CONTROL - Practice proper sanitation. A thorough inspection should be made and properly recorded first. Correctly identify the species. Practice proper sanitation. Note all in infestations and conditions and conditions conducive. Vacuum up any invaders inside or outside. Cricket control begins outdoors with the reduction or elimination of moist harborage near the structure, such as removal of bricks, firewood, stone, lumber, wood piles and other debris. Routinely mow your yard and keep all of your shrubs and gardens free of weeds and organic debris. Tightly seal and routinely clean garbage cans

with diluted Safe Solutions, Inc. Enzyme Cleaners and borax; stand them on bricks or blocks (off the ground). Repair all leaking plumbing and moisture problems inside and outside your building. Crawl spaces should be well ventilated and dry; the installation of a dehumidifier and/or a poly/vapor barrier and vents will help. Seal all entry points such as door thresholds by installing doorsweeps; caulk or seal or screen holes in masonry, around pipes, wires, facia, soffits, vents, trims, windows and doors and all visible cracks and crevices outside and inside. Eliminate all leaking plumbing, route downspouts away from the foundation. Lightly dust with talcum or medicated body powder or finely ground calcium chloride or, better yet, with food-grade DE. Maintain proper grade drainage, install vapor barriers in crawls and install air conditioning dehumidifiers and/or fans. Some crickets, e.g., field and house and sometimes ground crickets, are attracted to lights...so either shut them off or use them to attract crickets to their death in a bucket of soapy water or change outdoor lighting to less attractive sodium vapor lamps or yellow bulbs. Place glue boards or sticky tapes in and around entrances. Catch one and you will attract others to the sticky trap. Use aspartame baits. If you must (as a last resort) use a pesticide poison, use a 3% or less sodium borate or 5% or less boric acid bait, Not Nice to Bugs® and/or boric acid per label directions, but try food-grade DE, baking soda, Comet®, talcum powder or medicated body powder first. Remember, crickets can be found anywhere, especially where food, clothes, linens and books are stored and it is especially vital not to contaminate these items with any toxic poisons. It is far better to take the time to use silicone caulk, patching plaster, mortar, cement, foam insulation, etc. to permanently seal all cracks, crevices and other openings; to use a hammer and nails or screw driver and screws to permanently tighten all siding, trim, molding, framing, etc.; plumbing tools to correct all leaks and to clean up and permanently remove all cricket populations, harborages, food and moisture sources than to poison even one person...besides, you have to do this maintenance eventually anyway! Clean or simply spray infested areas with diluted Safe Solutions Enzyme Cleaners with Peppermint and/or Not Nice to Bugs® or use a steam cleaner.

Disodium octaborate tetrahydrate repels crickets and is slightly more toxic than boric acid; the reason being that it contains more boron per pound. NIBAN Granular Bait has a calculated LD_{50} of over 60,000 mg/kg or over 60 grams of product per 1000 grams of body weight. Spray crickets with 1 oz. Safe Solutions Enzyme Cleaner with Peppermint per 1 qt. water and they will die quickly. You can make your own boric acid baits or aspartame or food-grade DE baits using any food source the crickets seem to prefer, but all baits must be placed only where people, pets and/or wildlife can not reach them. Try corn meal sprayed or mixed with a water solution containing 1% - 5% sodium borate or aspartame or food-grade DE and place in out of the way areas - away from people, pets and wildlife. Lightly sprinkle food-grade DE, baking soda, Comet®, talcum, food-grade DE or medicated body powder or spray neem tree extracts in infested areas; vacuum when control is accomplished.

A Student's science fair project noted that diluted enzyme cleaner at 4 oz. of the original old preformed enzyme cleaner per quart of water killed 100% of the crickets in 45+ seconds. **Dish soap at 1 oz. per quart of water kills them all in 35 seconds**. Vinegar in water (at 4 oz. per quart) kills crickets in about a minute. Salt water will kill about 50% in about a minute. Lemon juice in water (4 oz. per quart) will kill about 80% in about a minute. (The new enzyme cleaner from Safe Solutions, Inc. killed 100% of the crickets in 10 seconds at a rate of 1 oz. per quart.)

Air Temperature - The higher the temperature the more they "chirp". Adding 40 to the number of times they chirp in 15 seconds gives one a fairly good estimate of the temperature in degrees fahrenheit.

MORMAN CRICKETS - The 2" long flightless Morman cricket looks more like a grasshopper and can travel in bands 3 miles deep and 1 mile across, marching through Western States, e.g., Colorado and Utah. A Morman cricket can walk over a mile a day over steep hills and valleys. Generally these crickets provide food for wildlife and contribute to nutrient recycling on range lands.

Typical First Strikes by Housekeeping/Maintenance

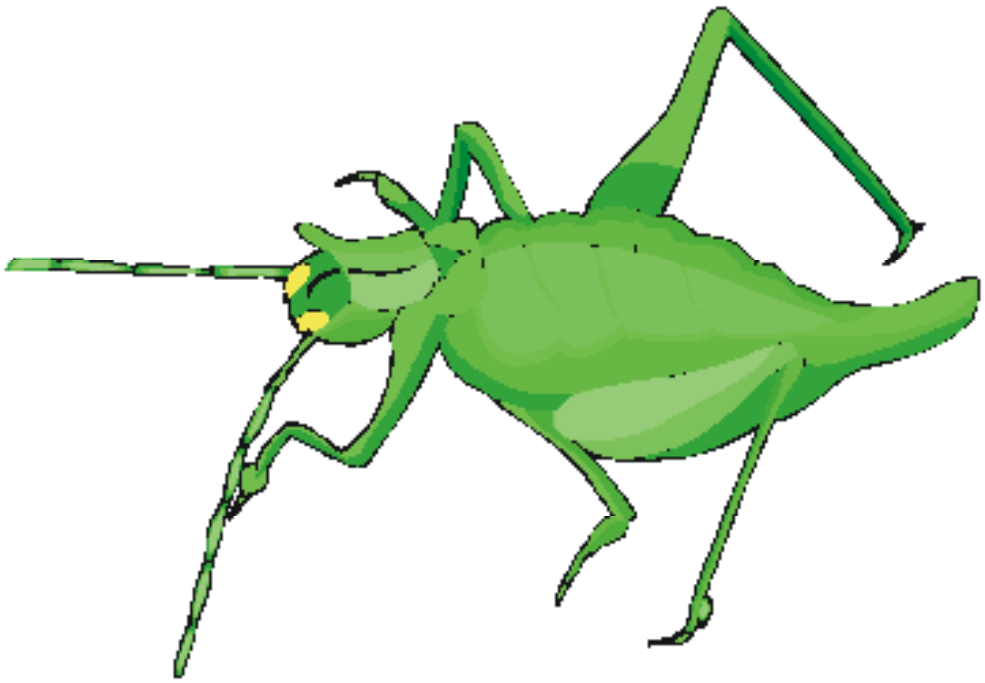
1. Practice proper sanitation. — Properly install doorsweeps. Reduce or remove all debris, mulch, leaves, rocks, wood, food, garbage, manure, weeds, tall grass, boxes, paper, grass clippings, brush and/or any other moisture-retaining items around and inside structures. Mow grass regularly.
2. Practice proper exclusion and habitat reduction. Raise garbage cans above the ground on concrete pads or bricks. Throw in some citronella/geraniol beads. Routinely clean gutters.
3. Caulk and seal the structure. Properly screen doors and windows and install door sweeps.
4. Inside: Routinely clean, remove clutter and lower the humidity. Then lightly dust with talcum powder or

medicated body powder or, better yet, Safe Solutions, Inc. food-grade diatomaceous earth (DE).

5. Reduce lighting outside or install yellow or sodium vapor lights.
6. Vacuum up all visible pests.
7. Glue traps or sticky-side-up duct tape or double-sided carpet tape can be used to catch them inside and outside.
8. Routinely spray neem oil or garlic oil and citrus oil and/or clean with diluted Safe Solutions Enzyme Cleaner with Peppermint (1 oz. to 3 oz. per 1 gal. water) and/or spray Not Nice to Bugs® or spray with 1 oz. Safe Solutions Enzyme Cleaner per 1 qt. water.
9. You can make a bait using corn meal or beer and diluted borax, but you must keep this bait out of the reach of people, pets and wildlife. Try food-grade DE or aspartame in your bait instead.
10. Crickets will not climb up the shiny side of duct tape and will stick to the sticky side of duct tape.
11. Install free-range Guinea fowl.
12. Dry out damp areas with vents, fans, dehumidfiers an/or air conditioning.
13. Make cricket traps. — Take a clean jar; cover the outside with cloth or masking tape. Create a solution of water and molasses and a dash of soap and then fill one-third of the jar with the solution. Place the trap where you have seen or heard crickets. Routinely empty and refill the trap.
14. If you are still having problems, read the rest of the chapter.

Good luck with the *noisy* cockroach!

If you are not part of the solution...you are part of the pollution!



***Safe Solutions products may be purchased online at:**
http://www.safesolutionsinc.com
or by telephone at:
1-888-443-8738.