Pest Notes

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"The Only Good Mouse Is.... One That Stays Outside!"

Effective Exterior Trapping Techniques

In keeping with our reader participation theme, we have developed another pop quiz. Are you ready? Great! Which of the following pests do warehouse pest managers list as the most difficult to control?

A) Cockroaches

B) Ants

C) Mice

D) Management

If you answered C, congratulations. If you answered D, it may be time to take a vacation. An informal survey conducted by Pest Notes found mice as the #1 problem pest. Why? Well, due to a variety of unique biological and behavioral traits, mice tend to be very elusive and difficult to capture. Therefore, once inside a facility, populations will often expand quickly, consuming and contaminating a variety of products and potentially causing structural damage.

So what is the most effective technique to manage mice infestations? Exclusion. In the following PCT-Online article, Dr. Bobby Corrigan describes excluding mice from facilities through implementing an exterior rodent trapping program. For assistance in developing a program, contact your local pest management professional or give us call.

Exterior Rodent Trapping Programs

Conventionally, exterior rodent control programs for commercial warehouses and food plants are made up

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You Can't Do It Alone!

Successful Pest Management Programs Depend on Client Cooperation

Every year the pest management industry develops new tools and techniques to manage pests. For example, millions of dollars are spent in product research and evaluation. Thousands of hours invested in training and program development. Yet, even with all these resources, many quality programs developed on paper are destined to fail. Why? Because many customers do not understand the importance of their active participation in program development and implementation.

The following PCT-Online article by Steve Smith clearly illustrates the importance of client participation. The hardest part of pest management is not program development, but rather, selling the idea of cooperation.

A Flying Success

When staff from the Idaho division of Potlatch Corporation, a manufacturer of paper products, discovered flying insects were getting caught in paper intended for use in food containers, they were obviously concerned. The specter of sending out milk cartons, take-out food containers, cups and plates speckled with insect parts was disconcerting to say the least.

"It was a big issue, " says Ann Williams, senior process engineer with Potlatch's Idaho Pulp and Paper Division, in Lewiston.

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of exterior bait stations along fence rows and exterior wall perimeters. But baits are not the only option available for commercial programs. Various types of trapping programs can be substituted for those accounts that desire less pesticide use around their facilities or want "recovery" of those rodents interacting with their facility. Let's examine exterior trapping programs a bit closer.

SNAP TRAPS INSIDE BAIT BOXES. Monthly rodent pressure on commercial accounts ranges from nil to constant, depending on various environmental factors. Of course, the accounts that experience very minor to no rodent pressure still require exterior programs that protect them should the incidental mouse happen along. But, for the PCO on these accounts, a program that also facilitates easy inspection is an attractive goal. Snap trap stations could accommodate these accounts.

Snap traps for mice can be installed inside conventional tamper-resistant rat-size bait stations and positioned along the traditional spacing and locations around food plant and warehouse facilities. Some bait stations are available (Aegis stations) with clear lids facilitating easy inspection. Depending on the particular bait station, the snap traps can be installed within the station's bait holding compartments or the station's entryways. To provide backup (or ensure multiple captures should they be needed) setting two traps per station is recommended. A drop or two of peanut oil, or a smudge of peanut butter on the mousetrap will serve as an attractant. Or, these baits can be placed onto a piece of wood or masonite and then placed within the inner-most compartment of the stations. This will facilitate the mice stepping onto the traps as they attempt to move toward the odor of the baits. The Snap-E quick-set, plastic-based mouse trap (Kness Manufacturing) and the Quick -Set (Woodstream) are plastic-based mouse traps that offer quick setting with one finger--a big plus when many trap stations need to be checked. Snap trap stations could also serve as a means by which to install ant baits, cockroach baits, cricket baits or slug baits for those areas needing control of these perimeter pests as well.

REPEATING CATCH, CURIOSITY TRAPS. All of the brands of multiple-catch mouse traps (i.e. "curiosity" traps) can also be used for exterior trapping programs. Some facilities use these traps outdoors placed at the same spacing as bait stations. Some even install the traps "alfresco" along their building perimeters and fence rows (i.e. without any protective boxes or cover). However, installing multiple-catch traps into another box or beneath a cover is recommended to ensure long-term effectiveness. Otherwise, the traps are subject to water, dirt, dust, leaf litter and the like getting into the traps and rendering them corroded, difficult to clean, or worse, causing them to jam. Moreover, a covered trap station visually presents more of a substantial rodent control program than multiple-catch traps sitting out on the ground unprotected.

Plunkett's Pest Control Company, Minneapolis, Minnesota, installs their exterior Ketch-Alls into large size metal bait stations (the Rat Cafeteria made by Solvit Inc.) Kness has introduced an exterior plastic cover that completely covers and snaps down onto their Ketch-All trap. If the interest in exterior trapping increases by the food and warehousing industry, perhaps other trap manufacturers (e.g. exterior covers for the Tin Cat) will follow suit.

Despite these interesting developments, exterior trapping programs are not appropriate for every situation. This approach has advantages and disadvantages that are important for consideration by both the PCO and the client.

ADVANTAGES. Perhaps the greatest advantage to an exterior trap is that it stops the mouse prior to it entering the building. Mice that have been poisoned by an exterior bait may live for another three to seven days following their feeding. IN this time, they may enter the building and will need to be recaptured to prevent them from dying in inaccessible areas or equipment, contaminating product or hiding in outgoing product and causing problems on the receiving end. Such mice have

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caused significant inconveniences for food manufacturers and warehouses over the years.

Trapping programs also reduce the overall amount of pesticide used for the facility's pest management program. There are no pesticidal baits to discard and replace. Trapping programs also allow you to monitor the species of mice interacting with the property. Have the droppings seen in the exterior stations been from voles, shrews, deer mice, rats or house mice? Or perhaps even toads or large insects? Knowing the primary species interacting with the exterior walls and fences is important in management options and programs.

Furthermore, unvisited trap stations do not require any change or replacement of trap, and trapping programs are time- and money-savers for those plants with low rodent pressure.

DISADVANTAGES. If snap traps are used, set-off traps obviously cannot capture any new rodents. PCOs can minimize this disadvantage by using two or more traps per station. Also, the disturbance of snap trap stations can prematurely set off the snap traps. Food inspectors may interpret a snapped trap as a miss instead of considering that a disturbance may have triggered the trap.

Along moist walls, and after wet days, the metal springs of snap traps may rust or break. In colder regions, snow and ice may render mechanical traps ineffective. Some companies remove their trap stations during this period, or switch to installing baits nearby vulnerable potential entryways. If curiosity traps are used, they must be kept clean and in good working order. It's easier to clean bait boxes of rodent droppings than it is to clean curiosity traps of decaying carcasses. Thus, for facilities under constant mouse pressure, repeating curiosity traps may not be cost-effective due to the extra service time needed. Using plastic insert trays or glueboards inside the curiosity traps will facilitate quick removal of carcasses. Still, such facilities might receive better rodent protection with rodenticide baits, or a combination of baits and snap-trapping stations.

Once the exterior trapping program begins, some accounts want the traps checked as often as the interior traps (i.e. weekly), resulting in higher costs. If traps are not inspected and emptied regularly, during warm weather, decaying carcasses can attract flies and dermestids. For facilities under both rat and mouse pressure, standard exterior baiting targets both rodents, whereas exterior trapping is most suited for mouse control.

As we approach a future of reduced pesticide use for the food and warehousing industry, exterior trapping may be the right tool at the right time for some facilities.

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SIDE BAR: OPINION

Giving "Environmentalists" What They Want-- A World Without Pesticides

PCT-Online

Dr. Richard Kramer

For years now, I have been frustrated listening to environmental extremists hurl accusations at our industry and the pesticide products we use. The rhetoric and proclamations of "environmental spokespersons" for various public interest groups such as NCAMP, CATS, NRDC and others is that they don't want to ban all pesticides, just the bad actors. Unfortunately, they consider all pesticides to be bad actors to some degree; thus, their goal is to rid the world of all these "horrid" substances.

It seems that despite all we do as an industry to achieve risk reduction while maintaining a relatively pest-free environment, out efforts are never good enough for the environmentalists. They profess to be experts in toxicology and pest management, often convincing ill-informed public officials to pass anti-pesticide legislation. Perhaps it's time to give them what they so desperately seek--a world without pesticides.

REMEMBERING THE PAST. A review of history provides us with excellent insight into what the world

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The insects, later identified as flying aquatic insects such as black flies, midges and caddisflies, were landing on the paper as it traveled through a winding machine, where large rolls of paper are cut into smaller roles. Because the winders travel at very high speeds, the unsuspecting insects, upon landing on the rolls were immediately wound into the roll and onto the paper. After traveling through the winder, the paper is sent through an extruder that lays a thin polyethylene film over the paper, thus sealing the insect's fate and locking them into the paper permanently.

Because the pests were sealed in between the paper and polyethylene film, no insects would have actually ever come in contact with the food held in the boxes. That said, sending a client thousands of food cartons dotted with flying insect parts, was not exactly Potlatch's idea of customer service excellence. "Obviously if they open the carton and find that there is an insect in there, even though it's under polyethylene, it's not a real comforting thing to find," Williams said.

Adding insult to injury was the company's struggle in finding relief from the situation. "None of us were really educated on pest control," Williams noted. "The more insects we saw, the more we just sprayed outside, and that really didn't phase it very much, " she said. Though Potlatch had contracted with a local pest control company, results were few and far between, and the problem was slowing productivity. Spot detectors along the manufacturing line were identifying enough defects that certain machines were lying idle. The downtime was beginning to affect operations, and throughout 1993, the problem was still unresolved.

A COOPERATIVE SOLUTION. To analyze the contamination issues, a team of 12 Potlatch employees was formed. The group, deemed the Contamination Team, began looking for pest control companies to provide a solution.

"Our salespeople had a meeting with Potlatch's environmental services team and they referred us to Potlatch's contamination team, " said Jeff Weier, technical director of Sprague Pest Solutions, describing how his company first became aware of the plant's predicament.

"We started meeting with their contamination team over a period of months to talk about the problem and what we could do for them. So it wasn't just coming n and throwing a bid at them," Weier said. Potlatch, impressed with the approach, hired the Tacoma, Washington-based company, and by the spring of 1994, Weier was traveling out to the mill several times, conducting inspections and developing a plan.

The finished products area of the plant, where the insect problem existed, is a two-level structure covering 1,200 feet in length and more than 200 feet in width. "There were lots of little things that needed to be corrected, lots of little openings the insects could come through, doors being left open and not screened, etc.," Weier said. Furthermore, the insects were breeding in a river that ran within 100 yards of the plant.

THE NEXT STEP. After sizing up the situation at the plant, Weier wanted a system to pinpoint the areas of significant pest activity in the building. He remembered a presentation he heard by Richard Brenner about a new software system developed to make a pest contour map of the facility. Brenner heads up the USDA's Agricultural Research Services' Gainesville-based Imported Red Fire Ant And Household Insect Research Unit. He and a team of researchers had developed a system that, after entering data about the amount of trap catches at various locations in a structure, would then make a map of the structure highlighting those areas most in need of pest control measures.

"I had heard Rick Brenner speak before and I thought this situation would be a perfect application for the mapping programs. So I went down to Florida to work with him for a couple of days to learn how to use the software. I learned the process from him and applied it to the account. I couldn't have done it without him, " Weier said.

Monitoring. The Sprague crew then placed 135 light traps around the building and monitored the trap catches weekly. "We collect the insects, weight them, plot the information (using the mapping system from Brenner) and go from there," Weier said. If the

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plan sounds high-tech, it is, but if it sounds costly, it isn't." "It's not really expensive--you just need a computer and the software system," Weier said.

In addition to monitoring trap catches to identify areas of intense insect activity, the Sprague crew set up a system to monitor environmental conditions in and around the plant, including air temperature in various areas, and the temperature of the river.

"They're aquatic insects, so they hatch based on river temperature, " Weier said. By monitoring the water temperature, Sprague professionals can tell when there's a likelihood of hatching (i.e. when the water temperature is higher), and then alert the facility to be on guard. "We have a big sign we put out, like a forest fire danger sign, but it's an insect danger sign," Weier said. When the sign goes up, the plant's employees can then monitor the sign on their way in and, if the insect activity is high, know to be extra careful, making sure doors are closed quickly, etc.

Control. After inspecting the account and monitoring to determine the areas of highest pest intensity, Weier set out to create an IPM control plan based primarily on structural modification. Openings were sealed or screened, and new doors were installed to limit the pests' entry into the building. Double or airlock doors were also installed on all the doors in the building, so that there is no area where the pests have direct access to the building from outside. In areas where large industrial-sized doors were used and opened often for operational needs, rapid roll-up doors were installed.

"We had one door there, which, when we first started, we sat there and watched it and timed it. It took about a minute and a half to roll up and another minute to roll down. We replaced it with a raid roll-up door and it opens and closes in a matter of seconds. The less time the door's open, the less chance there is for any insects to come through it."

The structural modifications continued. Color filters were put on glass in doors and windows to keep insects from seeing the light coming from the plant. Previous outdoor lamps were switched to high-pressure sodium lamps, which are less attractive to the insects, and lights were moved off the building and on to poles.

All in all, virtually no pesticide was used to resolve the problem. "We probably use 50 gallons of diluted chemical a year at the most, and that's not much," Weier said. "We were looking at using some pesticide out in the holding ponds, but we discovered that was not the source of the problem. We do a very small application around the lights and areas of the wall that are illuminated by a light and thus attractive to the insects."

While the structural modifications were fairly classic and straightforward, says Weier, the biggest challenge was keeping pests out while also keeping the plant operational and not restricting its systems and productivity. While rapid roll-up doors and other similar structural changes helped significantly, the greatest success came from working and communicating well with the client. Sprague staff meets with the plant's contamination team monthly, discussing levels of product contamination, levels of insect activity and educating the account about pest prevention methods.

The teamwork paid off for both parties, making the pest control effort easier and educating Potlatch staff about the role they played in preventing the infestation. "It has been a real education process to make people aware of how serious an issue it is, because any pest control program is only as good as the employee that remembers to shut the door when he or she comes through the door," Williams said. "We can put up all the fine mesh screen, and all the light traps in the world, but if we have people leaving doors open, it doesn't do a lot of good," Williams said.

THE RESULT. The mapping software and the subsequent control plan combined with the client/PCO cooperation all had a significant impact on

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the pest problem at the account, and the problem has been under control for four years now. "The pest pressure at the account has always been bad. It was significantly affecting their ability to produce their product. But now there is a much better situation," Weier said. Williams agrees.

"The problem is greatly diminished. It's not perfect yet....but it is certainly very, very much improved, " she said. Indeed while the initial program has been a success it is in many ways just a beginning. Still today, a Sprague technician monitors the account weekly and Weier visits the account at least once a month, if not more.

Illustrative of this ongoing effort is the fact that currently Sprague professionals and the plant's contamination team are meeting to discuss making some significant capital improvements to the building, making it harder for the pests to gain entry into the winding areas.

While the plan is ongoing, and plant and the Sprague staff is continually searching for ways to improve, they both relish in the success of what they've accomplished together. It is a large scale, high-tech, commercial IPM plan that has truly worked. "The point is that by identifying the insects and the source, we realized treatments weren't the answer to this particular problem, and that you can get cooperation from a major client of you work with them," Weier said.

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would be without pesticides. Unquestionably, it is not a world in which any of us would want to live.

Arthropods, which have been associated with disease since the beginning of recorded time, have shaped world history. The oldest and perhaps most well publicized sequence of ecological events involving pests and disease were the 10 plagues of Egypt and the survival of the Israelites who followed Moses into the desert for 40 years.

Besides starvation, the most plausible explanation for the high mortality rates of the Egyptians is dysentery, cholera, typhus and yellow fever--all insect-borne diseases. Hordes of flies covered the land; mosquitoes and lice transmitted numerous pathogens; and locusts, whose numbers were so immense that they darkened the sky and devoured the crops. If only they had pesticides to control the flies, mosquitoes and lice and thereby stem the spread of diseases. If only they had pesticides to control the locusts and thereby prevent starvation.

The Black Death (or plague) has been the scourge of humankind since before the beginning of the Christian era. This bacterial disease is transmitted from rodents (e.g., typically rats) to humans through fleabites. The first great plagues occurred between 430 BC and 690 AD. The second plague pandemic, which occurred between 1050 and 1200 AD, affected parts of Asia, Africa and most of Europe. It is estimated that in Europe more than 25 million people died (i.e., one quarter of the population). This event alone led Europe into the devastating despair of the Middle Ages. The plague destroyed entire cities and all trade cane to a grinding halt. An additional major outbreak of the plague devastated the world from 1346 to 1349. It is estimated this pandemic resulted in more deaths than the combined number of deaths in World Wars I and II. If only they had pesticides (Pest Notes: and better sanitation practices and public health system) to control the fleas and rats...

Napoleon Bonaparte suffered two major defeats as a

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result of arthropod-borne diseases, which undoubtedly changed the course of history. IN 1802, yellow fever, a mosquito-borne disease, decimated Napoleon's fleet and troops who had landed in Haiti and were attempting to force the native islanders into submission. The French, who had purchased Louisiana from Spain, intended to use Haiti as their base of operations to support colonization and fortification of Louisiana. Yellow fever caused such significant losses that the armada had to return to France and abandon any thought of occupying Louisiana. If only they had pesticides to kill the mosquitoes and repel their bites....

Ten years later, in June 1812, Napoleon set his sites on Russia. He began this conquest with more than 420,000 men. By the time he reached Moscow in October, however, his forces had obviously suffered the casualties of combat. But more significant losses were the result of starvation, cold and louse-borne typhus. The latter was suspected to be the major cause of Napoleon's defeat in Russia; however, this disease was not actually identified for another 100 years. If only they had pesticides to control the lice and epidemic typhus....

CONTEMPORARY DISEASES. Many other dramatic examples of how arthropod pests and their transmitted diseases have affected history can be cited. Suffice to say these diseases have changed the course of history. And while many of these diseases are not as problematic as they were in the past, new diseases potentially could result in equally devastating effects on human health if we were without pesticides and modern pest management practices.

Eastern equine encephalitis (EEE) occurs almost exclusively in the eastern part of United States. It does not affect large numbers of humans; however, the population at greatest risk is young children. Plus, the death rate of infected individuals, reported in two studies, was between 60-75%. How many deaths would there be annually without pesticides?

Hantavirus, the newest disease associated with rodents (i.e., especially deer mice), is contracted by inhaling urine and fecal-contaminated dust which contains the virus. The disease is characterized by flu- or pneumonia-like symptoms and often is not readily diagnosed. The consequence of delayed diagnosis is usually death (i.e., about 60% fatality rate). Most fatalities have occurred west of the Mississippi River. How many deaths would there be annually without pesticides? (Pest Notes: probably not the best example due to the localized nature of this disease and the nature of transmission).

Dengue is a viral disease transmitted by *Aedes aegypti* and *Ae. albopictus* mosquitoes. It is commonly referred to as "breakbone fever." Dengue occurs in four forms. Typically, symptoms include headache, rash, fever, nausea, and vomiting. Dengue has gradually moved north from the tropics and now occurs regularly in Puerto Rico, Mexico and occasionally southern Texas. How many cases of this disease and its incapacitating effects would there be annually without pesticides?

(Human) malaria is caused by four species of *Plasmodium* and accounts for millions of human deaths worldwide. Successful transmission of malaria requires two hosts (e.g., mammal, bird, amphibian, etc, and a blood feeding arthropod, usually mosquitoes). The disease is transmitted to humans by mosquito bites. Malaria, which had been eradicated from the United States, is now staging a comeback. This renaissance is due to a large amount of people immigrating from malaria-infested parts of the world, the deterioration of living conditions in large southern metropolitan areas and the presence of malaria vectors, Anopheles mosquitoes. How many deaths would there be annually without pesticides?

Cockroach allergies were the subject of a 1997 New England Journal of Medicine research article titled, "The Role of Cockroach Allergy and Exposure to Cockroach Allergen in Causing Morbidity Among Inner-City Children with Asthma." The study

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concluded: "The combination of cockroach allergens and exposure to high levels of this allergen may help explain the frequency of asthma-related health problems in inner-city children." In another study of 100 asthmatics in inner-city housing projects, 89% of the subjects exhibited hyper-sensitivity to cockroach allergens. Exposure to these antigens can result in significant medical problems and. in extreme cases, death. In fact, asthma related deaths have increased 50% in the United States during the last 10 years (Pest Notes: how many of these deaths are attributable to cockroach allergens is in question). How many more children would suffer or die because of cockroach allergens without pesticides?

THE REAL STORY. Today we are fortunate to have pesticides (and industries) that seek to preserve life and health and do so with an infinitesimally small risk of exposure and injury. Given the choice, most people would choose to live their lives without fear of starvation and exposure to horrific diseases such as plague, malaria, Lyme disease, hantavirus and others.

The next time you hear and "environmentalist" ranting about the horrific effects of pesticides and the deaths that result from their usage, ask them to show you the numbers. Then ask them what these pesticides are doing to prevent starvation and disease. If we travel down the road they are charting for humankind, history will repeat itself. It is time we tell the real story and put an end to the scare tactics and lies their organizations use to sway public opinion.

(Pest Notes: While Dr. Kramer's article tends to be a bit sensational, and many of his examples clearly overstated, his reasoning is sound. Because successful pest management programs are composed of a variety of techniques including chemicals, we can not limit our chances of success based on misinformation. All pest management and public health decisions must be made through risk assessment, sound science and common sense.)

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Germ-Transmitting Flies

Dr. Jerome Goddard

Most people agree that flies are nasty. But why? And are all flies equally nasty? Let me start with the second question. In my opinion, the answer is "no." They aren't all nasty, but "filth flies" certainly are. Other fly species breed in water, mud, vegetation, etc. and aren't as dirty in their habits.

What are filth flies? There are thousands of species of flies in the world, but only a few are referred to as "filth flies." Although other species or groups could also share the designation, "filth flies" are generally houseflies, fleshflies and blowflies. They are the domestic, non-biting flies commonly seen in and around human dwellings.

Houseflies are about 5 to 8 mm long with a dull gray thorax and abdomen (not shiny). They have four longitudinal dark stripes on their thorax. Houseflies breed in feces, decaying organic material and foodstuffs.

Fleshflies look like houseflies but are generally larger (11 to 13 mm long). They have three dark longitudinal stripes on their thorax, a checkerboard pattern of gray on the abdomen and sometimes a reddish-brown tip on the abdomen. Fleshflies breed in decaying meat or animal excreta.

Blowflies (also known as green or blue bottle flies) are about the same size as fleshflies, although some of the bluebottle flies (genus *Calliphora*) are larger and more robust. Blowflies, with the exception of the cluster fly, are metallic bronze, green, black, purplish or blue colored. Most blowflies breed in dead animal carcasses, although some breed in decaying vegetable matter and some are parasites of frogs, earthworms and even mammals.

Transmitting Disease. Filth flies don't bite, so there can be no biological transmission of disease agents (as is the case in malaria, dengue, sleeping sickness, etc.) So then, how are they medically important? Flies-- as well as many other insects-- are covered with numerous hairs, setae and spines that can pick up germs and other contaminants. These germs can be physically transported from one place to another-- a phenomenon called mechanical disease transmission. If a fly has been walking around on

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dog feces and subsequently lands on our piece of cake...well, you get the picture.

Filth flies have been reported to carry organisms causing diseases such as typhoid, diarrhea, amoebic dysentery, cholera, giardiasis, pinworm and tapeworm. Certainly not all these organisms are on all flies; it's just an indication of the wide variety of germs that flies can possibly transmit. One of the hazards from filth flies is when they feed on liquids containing disease germs. Later, both vomit drops and fly excreta can transmit infection. Experiments have shown that salmonella can multiply in the mid-and hindgut of flies and be passed in excreta for up to a week.

Prevention and Control. Filth flies are best controlled by a combination of good sanitation, mechanical exclusion, ultraviolet light traps and chemical control. Good sanitation means finding and eliminating breeding sites--like emptying and steam cleaning dumpsters on a regular schedule. Mechanical exclusion methods include air curtains and properly fitted doors and screens being used. UV light traps work well indoors and are now marketed in a variety of designs and models (some don' t even look like fly traps. If filth flies reach extremely high populations numbers in an establishment, fogging with pyrethrins will provide instant relief, but long-term control must include finding and eliminating the breeding sites.

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"Nuts" to the Concept of German Cockroach Resistance

Dr. Richard Kramer

During the Battle of the Bulge, one of the most famous conflicts in World War II, Allied forces found themselves completely surrounded by the German troops. When the Germans offered to allow them to surrender, the commander of the Allied forces responded with a one-word answer---"nuts." But then the Allies went on to break out of their predicament. A similar situation exists with resistance in German cockroaches, i.e. technicians often feel completely surrounded and overrun by this problem, yet we have in out arsenal the tools to simply say "nuts" and win the war.

In the Journal of Economic Entomology and article by Steven M. Valles entitled Lambda-cyhalothrin Resistance Detection in the German Cockroach (Blattodea: Blattellidae) focused on methods of detecting resistance to this type of insecticide. The article reported significantly high resistance to lambda-cyhalothrin of field collected populations of German cockroaches. This article serves as a reminder that resistance to some insecticide classes is readily present. On the surface, this news should be shocking considering that the active ingredient was only recently introduced into the urban pest management marketplace. However, in my opinion there is no need for surprise or alarm.

DON'T FEAR RESISTANCE. This apparently rapid onset of resistance is nothing new to the industry. When bendiocarb was first introduced to the cockroach control market in the mid-1970s, reports of resistance were almost immediate. It was ultimately determined that German cockroaches were predisposed to bendiocarb resistance due to their heavy and repeated exposure to the organochlorine insecticides during the 1050s and 1960s. This phenomenon typically is referred to as cross-resistance. By combining bendiocarb with a synergist piperonyl butoxide (PBO), this resistance pattern was overcome.

A similar situation has occurred with many pyrethroid insecticides (e.g., lambda-cyhalothrin) due to the extensive use of a wide variety of pyrethroid insecticides during the past 15 years. To some extent, resistance has been a problem with all the major classes of insecticides, i.e., chlorinated hydrocarbons, carbamates, organophosphates and pyrethroids. Now, use of chlorinated hydrocarbons has ceased, use of carbamates and organophosphates has declined and pyrethroids have become the main staple with regard to liquid insecticides for German cockroach control.

Only low levels of resistance have been reported for acephate, the lone organophosphate that has stood the test of time, in comparison to the two most widely used organophosphates, diazinon and chlorpyrifos. The reformulation of these products as baits raises some concern in my mind. However, the fact that these products are ingested may circumvent several of the resistance mechanisms that reside in the cuticle of

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cockroaches (e.g., thickening of the cuticle, thicker wax layer, increased lipids, etc.) Only time will tell. As recent as five years ago, I never would have considered the possibility that resistance to insecticides in German cockroaches was of little consequence. Today, however, because we have new tools that allow us to effectively manage and, in many cases, exterminate cockroach populations, the future of cockroach control is bright and resistance should be of minimal concern. The key words in this discussion are German cockroach populations. Populations, not species, are managed and exterminated. Resistance is a problem in German cockroach populations, not in the species. In fact, through selection with insecticides, the industry has created strains of cockroaches that vary significantly in their resistance to insecticides.

For instance, the population in one apartment building might be significantly different from the one across the street based on the products used in the respective buildings. Population differences are less likely to be a problem among apartments in the same building due to similar exposure patterns and the ability of cockroaches to move more freely among units and interbreed.

COUNTERING RESISTANCE TENDENCIES. Resistance has been a major concern with German cockroaches but of little consequence with the other major domestic species (e.g., American, oriental and brown-banded cockroaches). This is due to the reproductive potential which is significantly greater in German cockroaches than in any of the other species. German cockroaches easily produce four to five generations per year as well as numerous egg capsules which may contain twice as many eggs as other species. And although large populations of other species also might be encountered, they require a long time to grow. In addition, other species of cockroaches are less affected by resistance because populations typically are eradicated quickly without extensive pesticide applications. The key is applying an appropriate product in the right place.

I see no reason for alarm about controlling and eradicating cockroach populations because our industry has the tools (i.e., baits and boric acid) to do the job and these tools have not shown significant development of resistance. If you choose to use liquid insecticides, which also can be effective, there is no need for change. However, if liquid insecticides aren't working, consider a few points about baits and boric acid. There's no evidence of any significant resistance to any of the active ingredients used exclusively as baits, e.g. hydramethylnon, abamectin, fipronil and boric acid. Since these products are stomach poisons designed for ingestion, they are not subject to some of the resistance mechanisms that affect the insecticides applied as surface sprays and are absorbed through the cockroach's cuticle.

TAKING THE BAIT. Baits are less likely to be abused. Because they are often visible, there are fewer tendencies to reapply them on a frequent basis. Sprays are not visible, so when cockroaches are still seen in an account, the tendency is to reapply the product. Baits are applied at fixed concentrations which precludes mixing the product at a reduced application rate in order to save money or at a higher rate in order to ensure that the product is strong enough to be effective. Both practices can result in the development of resistance.

Research efforts currently focused on developing new active ingredients as baits (with less interest seen in development of new liquid residuals) for German cockroach control will lead to new products. These products will have different modes of action which then will circumvent the resistance problems currently found in German cockroach populations. Today, few technicians complain about resistance; many, however, express concern that we are putting ourselves out of business through the use of more effective tools, such as baits. Fear not!

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'Smarter' Pesticides Use Favored By Technicians

Brad Harbison

Pest control is unique in that in most cases more than one solution exists for a particular pest problem. This is important because with today's changing

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(Smarter pesticides.....continued from page 10)

climate in which certain pesticides are being banned or restricted, a service technician may not be able to use his or her first treatment option.

In recent years many in the pest control industry have changed their approach to pesticide use. Instead of widespread spraying, they are treating with reduced use, targeted applications.

"In the last year our pesticide use has increased because we have more accounts, but the pesticide use per account has decreased because we are using more baits," said George Rivers, manager, Sunstate Pest Control, Rockledge, FL..

For example, many pest management professionals have begun treating for roaches and termites with baits. The amount of pesticide in the baits is far less than what would be used for a perimeter spray (in the case of roaches) or a soil treatment (for termites). In theory, the baits will be as effective--and some would argue more effective-- as liquid pesticides because the application is targeted.

"Our technicians have found baits to be effective and they have said that they have had reduced callbacks since we began using them," said Bruce Hudkins, branch manager, Standard Exterminating, Princeton, West Virginia.

Baits are being used for control of a wide variety of pests. A number of pest management professionals say they have had the most success baiting social insects (such as ants and termites) because these pests collect food and share it with their colony.

AN INTEGRATED APPROACH. The rise in the popularity of baits has led to a more limited use of pesticides, but that's not to say that pesticides will eventually be eliminated from a pest management professional's arsenal.

"You are going to be seeing more and more baiting and IPM, but (spray) pesticides still have a niche, " Hudkins said.

For example, in cases where immediate action is needed to protect public health and in cases where certain pests don't respond well to baits, spray pesticides may still be the preferred choice.

A trend among pest management professionals is to use baits as part of an integrated pest management (IPM) program. IPM relies more on quality inspections, monitoring, and exclusion work and less on large-scale pesticide spraying.

POPULAR WITH THE PUBLIC. Another reason why large-scale pesticide usage has decreased in recent years is mounting public pressure.

"There has been more concern (about pesticide use) over the last couple of years mostly due to what people hear on TV and read in newspapers. They really only get one side of the story, " said Tod Davies, a 19-year pest control manager, who works for Sorbee-Med, Philadelphia, PA

Because of this public concern, many pest control companies have been using IPM programs.

Hudkins said his company used to spray in schools and in nursing homes, but now has gone completely to IPM. This gradual movement away from large-scale spraying was not initially greeted with unabided enthusiasm by the general public.

"At first it took people were used to spraying, but we have had to convince them of other methods," he said. "We've had to re-educate people that pesticides are still being used, but they are just in the form of baits and the applications are being targeted."

In the long-run the switch to an IPM program relying heavily on baits has been beneficial to his company, Hudkins added. "Technicians like the baits a lot because they have been effective and have reduced callbacks to the office, " Hudkins said.

Rivers agreed that being able to communicate to the customer how baits work is crucial to the overall

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(Smarter pesticides....continued from page 11)

effectiveness of an IPM program.

"Our technicians explain to them that when you spray you are just killing the foragers and that to eliminate ants you have to destroy the nest, " Rivers says. "They tell them that with baits you are poisoning the ant's food supply and that when the larvae hatch they will be looking for something to eat and they will eat the baits. In other words let the ants do the work.

CONCLUSION. At one time pest management was more of a spray first, treat later proposition. However, the days when wide-scale pesticide spraying was the major means of control are gone. The pest control industry mow generally favors limited use of pesticides. This shift has allowed pest management professionals to rely on their problem-solving skills and pest knowledge and helped them allay the public's fear of wide-scale pesticide use.

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IN THE NEWS.....

EPA's Pesticide Product Label System Now On Web

EPA's Pesticide Product Label System (PPLS) is now available on the internet. PPLS is a collection of images of pesticide labels approved by the Office of Pesticide Programs (OPP) under Section 3 of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

EPA has posted the collection to make EPA's pesticide regulatory program more readily accessible to the public. The collection contains the initially approved label for pesticide products registered under FIFRA, Section 3, as well as subsequent version of labels which have changed via amendment or notification.

Tools Suggest Early Humans Dined on Termites

CNN.com

WASHINGTON-- Early humans liked termites so much that they made special bone tools to grub out the juicy insects, a new study says.

The finding suggests that some of humanity's earliest ancestors had a diet that was more varied and nutritious than was earlier believed, Lucinda Backwell of the University of Witwatersrand and Francesco d'Errico of the National Scientific Research Center in Talence, France, said earlier this week.

"Previous studies have suggested that modified bones from the Lower Paleolithic (old stone age) sites of Swartkans and Sterkfontein in South Africa represent the oldest known bone tools and that they were used by Australopithecus robustus to dig up tubers," they wrote in their report, published in the Proceedings of the National Academy of Sciences.

"However, our analysis suggests that these tools were used to dig into termite mounds, rather than to dig for tubers."

Chimpanzees are frequently seen using sticks to "fish" for termites, but it has been unclear how much early humans depended on bugs for food and what sort of tools they used to catch them.

Backwell's study suggested that the hominids carefully selected their tools, as thousands of bones of a similar size and shape were found at the site and found to have the distinctive markings made by poking into a termite mound.

Pat Shipman, an anthropologist at Pennsylvania State University who has studied tools at the site, called the research "remarkable" and said it needed to be looked at closely.

The sites are anywhere between a million and 1.8 million years old-- methods of dating them are not precise. Earlier researchers found the bones and determined they had been used to dig up tubers.

Tubers are an important source of food to modern humans as well as cassava, peanuts and potatoes.

But it is hard to tell what a tool was actually used for. Backwell and d'Errico ran extensive tests on the bone fragments to see what could have caused the marks on them, and did comparisons to make sure that, for example, an animal chewing on them

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did not make the marks.

The wear pattern most closely resembled that made when a bone tool is used to dig into a termite mound, they decided.

Big, heavy digging sticks are usually used to get at tubers, the researchers said.

Knowing this is important in understanding the diets of human ancestors, the researchers said. "Termites are a valuable source of protein, fat and essential amino acids in the diets of both primates and modern humans," they wrote. "While a rump steak yields 322 calories per 100 grams and cod fish 74, termites provide 560 calories per 100 grams."

They said it is not clear which early or pre-human used the tools at the site, noting that remains of both Australopithecus robustus and of a species of Homo-- the group that includes modern humans-- are there.

Such nutritious food would have been important for the survival of Australopithecus, Shipman said, because the hominids otherwise survived on vegetables they could forage while later species added meat to their diets.

"IT seems irresistible to conclude that robust australopithecines may have relied on termites seasonally or even year-round in addition to vegetable foods," Shipman wrote in a commentary on the research.

(Pest Notes: Could this could be a new termite control method?)

Zoecon, EPA Reach Agreement On Label Changes For Catalyst Insecticide

Schaumburg, IL: Zoecon Professional Products' Catalyst Insecticide product will undergo a label change to reflect an agreement between Zoecon's parent company, Wellmark International and the Environmental Protection Agency (EPA). The active ingredient in Catalyst is propetamphos, an organophosphate.
The agreed-upon changes allow PCOs to continue using Catalyst for cockroach control in commercial applications. Catalyst has long been regarded as an effective clean-out product for commercial infestations requiring fast remediation. Although the label revision will eliminate residential uses of Catalyst, the EPA decision makes Catalyst the only remaining organophosphate approved for internal pest control and it is the only OP left for rotation of chemical compounds.

Catalyst will continue to be sold by Zoecon under the current label through June 2001. Distributors of the product can continue to sell current-label Catalyst product through April 2002 and PCOs can continue to use current label Catalyst until their inventory is exhausted.

Ants Suck on Own Larvae

Species May Be Link Between Ants and Wasps, Say Scientists
ABC News.com
January 10, 2001

San Francisco, CA-- A colony of cannibalistic ants discovered in Madagascar represent an important piece of the puzzle in understanding the evolution and behavior of one of the most successful insect species in the world, scientists said today.

The fearsome-looking insects, dubbed "Dracula ants" by their discoverers because they suck nourishment from their own larvae are believed to be a transitional species bridging the gap between ants and the wasps from which they evolved millions of years ago.

"A living organism cannot be a true missing link," said Brian Fisher of the California Academy of Sciences, who found the ant colony hidden in a rotten log about 55 miles outside of the capital Antananarivo.

"But this represents our best hope for understanding what the common ancestor was, which has been a huge impediment for understanding ant evolution."

While ants make up only about one percent of all

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described insect species, they are among the most widely spread and numerically dominant on Earth--and researchers want to understand the evolutionary secret to their success.

ANTS HAVE WASP WAIST

Madagascar, an island off southeastern Africa, is regarded as a treasure trove of biological information because its relative isolation allowed older, or "relic," species to survive without competition from newer arrivals.

While the genus of the "Dracula" species was first identified in Madagascar in 1993, Fisher's discovery of the first entire colony of insects allows scientists to draw a more detailed picture of ant evolution.

The Madagascar ants, belonging to the genus Adetomyrma, have just a single connection between their thorax and their abdomen instead of the two or three joints found in "modern" ant species, Fisher said.

"They have got this wasp waist, if you will," he said, adding that the single joint was a clear indication of the ants' link to earlier wasps.

The Adetomyrma ants also display a grisly feeding habit which Fisher believes may be the basis for the "social food sharing" that has come to characterize ant colonies.

Queens Cut Holes in Larvae

Queen and worker ants, when hungry, visit the colony nursery and cut holes into their own larvae to feed on the hemolymph, the equivalent of insect blood.

"They chew them until they bleed," Fisher said, explaining his decision to dub the genus after the vampire Dracula of lore. "We call this nondestructive cannibalism."

Fisher believes that this practice may have evolved into the practice of other ant species in which worker ants, which are unable to digest solid food themselves, feed the larvae, which regurgitate part of the digested food back to the workers for distribution around the colony.

Fisher said further study of the "Dracula" colony could provide more clues on the development of ant behavior--and could eventually force scientists to rethink their entire hypothesis of ant evolution.

"This initial discovery told us that our current hypothesis of the evolution of ants was inaccurate," Fisher said. "It is not just important in that it is a new species...it is an important piece of the puzzle in the evolution of life."

FALSE E-MAIL REPORT: HANTAVIRUS SPREAD BY CONTACT WITH SODA CANS OR GROCERY PACKAGES

CDC-Online

The Centers for Disease Control and Prevention (CDC) has received several inquiries about an e-mail report of a stock clerk who became infected with hantavirus while working in a storeroom. According to the e-mail message, the infection resulted from exposure to dried rodent droppings that were contaminated with hantavirus. The e-mail message warns the reader to take precautions when handling items such as soda cans and grocery packages (for example, cereal boxes) because they may be contaminated with hantavirus.

The e-mail report is untrue. CDC could not substantiate this report of a hantavirus infection, nor has CDC been asked to participate in an investigation of the incident described in the e-mail.

Hantavirus can cause a serious, often life-threatening disease called hantavirus pulmonary syndrome, or HPS. The viruses are carried by certain species of mice and can be spread to humans by exposure to virus-contaminated rodent droppings, urine or saliva.

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HIGH-TECH WARFARE: Military know-how used on rats

Navy Times
January 29, 2001

In Bradford, England, pest control contractors are experimenting with the use of global positioning systems to monitor their efforts to kill sewer rats. GPS, mounted on the exterminator vans, shows the exterminators which of the 40,000 sewer-system manholes they are at as they target the hot spots, according to a January 11 article in the local newspaper, the Telegraph and Argus.

It is far from certain that GPS technology will turn the tide in Bradford's battle against rodent infestation. Success likely will depend on other military-style tactics, such as reconnaissance and search and destroy missions.

EPA PUBLISHES NOTICE OF PROPOSED USE DELEYIONS FOR DIAZINON

On January 10th, EPA published a notice in the Federal Register (66 FR 1977) announcing receipt of requests from the registrants to cancel certain uses of the pesticide diazinon. The use deletions are consistent with the agreement between EPA and the registrants of diazinon announced on December 5, 2000. EPA is implementing the agreement to reduce the risks associated with diazinon to humans and the environment. All indoor and certain agricultural uses are affected by this notice. In addition, one registrant is deleting lawn use from its commercial manufacturing products. After these use cancellations become effective, diazinon technical and manufacturing use products may only be formulated into end-use products registered for certain agricultural uses, as listed in the Federal Register notice. The notice also includes information on proposed provisions for existing stocks of diazinon products. EPA must receive comments on this notice by February 9, 2001, identified by docket control number OPP-34225B.

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VECTOR-BORNE DISEASE OF THE MONTH

*Japanese Encepha*litis
CDC Travelers Health

DESCRIPTION

Japanese encephalitis (JE) is a common mosquito-borne viral encephalitis in Asia. Most infections are asymptomatic, but among patients who develop a clinical illness, the case fatality rate may be as high as 30%. Neuropsychiatric sequelae are reported in 50% of survivors. IN endemic areas, children are at greatest risk of infection; however, multiple factors such as occupation, recreational exposure, gender (possible reflecting exposure), previous vaccination and naturally acquired immunity, alter the potential for infection and illness. A higher case-fatality rate is reported in the elderly, but serious sequelae are more frequent in the very young, possibly because they are more likely to survive a severe infection.

JE virus is transmitted chiefly by the bites of mosquitoes in the *Culex vishnui* complex: the individual vector species in specific geographic areas differ. In China and may endemic areas of Asia, *Culex tritaeniorhyncus* is the principle vector. This species feeds outdoors beginning at dusk and during evening hours until dawn; it has a wide host range including domestic animals, birds and humans. Larvae are found in flooded rice fields, marshes and small stable collections of water around cultivated fields. In temperate zones, the vectors are present in greatest numbers form June through September and are inactive during winter months. Swine and certain species of wild birds function as viremic amplifying hosts in the transmission cycle. Habitats supporting the transmission cycle of JE virus are principally in rural agricultural locations. In many areas of Asia, however, the appropriate ecological conditions for virus transmission occur near or occasionally within urban centers.

OCCURRENCE

Transmission is seasonal and occurs in the
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summer and autumn in the temperate regions of China, Japan, Korea and eastern areas of Russia. Elsewhere, seasonal patterns of disease are more extended or vary with the rainy season and irrigation practices.

The risk to short-tern travelers and persons who confine their travel to urban centers is very low. Expatriates and travelers living for prolonged periods in rural areas where JE is endemic or epidemic are at the greatest risk. Travelers with extensive unprotected outdoor, evening and night-time exposure is rural areas, such as bicycling, camping, or engaging in certain occupational activities, may be at high risk even if their trip is brief.

PREVENTIVE MEASURES

Travelers are advised to stay in screened of air conditioned rooms, to use bed nets when such quarters are unavailable, to use insecticidal space sprays as necessary, and to use insect repellents and protective clothing to avoid mosquito bites.

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On The Web.....

www.pestalert.org: The North American Plant Protection Organization provides a great site to "disseminate information on emerging plant pests of significance to the plant production services of member countries." If you are interested in plant pests, particularly groups dealing with export, check out this site.

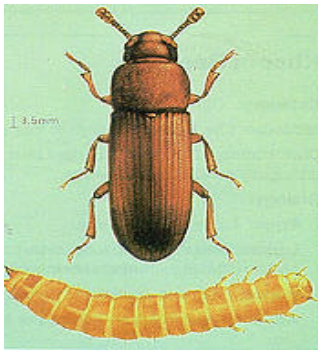
everest.ento.vt.edu/Facilities/OnCampus/IDLab/Fact/Fact3.htm: Virginia Tech University has put together a variety of household and pantry pest fact sheets which provide outstanding information for ID and management. Great place to get started on designing an IPM program for stored product pests.

www.ifas.ufl.edu/~pest/vector: The University of Florida has published a Public Health Pest Control Manual at this site. This is a terrific reference tool for those involved in the field. Take a look.

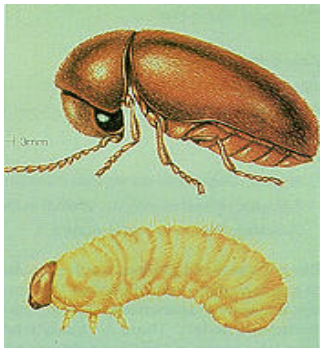
PESTS OF THE MONTH

See if you can identify the following. Last month's pests: A) Roof rat, B) Flesh Fly, C) Crow

A)



B)



C)

NOW AVAILABLE

DSCP-WCSO has produced two informational CDs: Stored Product and Facility Pest Management and Fresh Fruit and Vegetable Pest Management. Each contains a variety of information concerning specific areas of pest management presented in an easily accessible format. If you are interested in receiving one or both CDs please give us a call or send an email.

DSCP-WCSO has produced several pest fact sheets addressing identification and management of several common stored product and facility pests. For more information or a listing of available sheets, please give us a call.

Parting Shots.....

That's all for now. Remember we are here to address your pest management concerns. Give us a call at DSN 686-8122, commercial (510) 337-8122 or drop us a line at paa5245@exmail.dscp.dla.mil.