Welcome to the Summer edition of the **IPM in Health Care Facilities newsletter**, published by the **IPM in Health Care Facilities Project**—a partnership of the Maryland Pesticide Network and Beyond Pesticides in collaboration with the Maryland chapter of Hospitals for a Healthy Environment (MD H2E). The Project enables and facilitates transition to safe pest management practices at Maryland health care facilities. This newsletter is part of the Project’s outreach effort to share information with Maryland health care facilities interested in effective pest management that protects patients, residents, staff and visitors from unnecessary exposure to pesticides.

Facilities participating in the Project’s Partnership Program agree that IPM prioritizes pest prevention and non-chemical interventions as key components to **greening** their facilities. Under an IPM approach, only least-toxic pesticides are used as a last resort for pest management. This approach is especially important for patient and long-term care populations, which are especially vulnerable to chemical-intensive pest control methods that can cause or exacerbate the very diseases and conditions for which they are being treated.

Feel free to contact us to learn more about how you can improve patient, staff and visitor safety by reducing pest complaints and toxic chemicals in your facility—with no increase in cost.
Tips for Controlling Millipedes and Centipedes

Without proper preventive measures in place, these pests can enter homes, health care facilities, and other buildings. Understanding the biology and lifecycle of millipedes and centipedes, particularly what they eat and where they can survive, is critical to stopping an infestation and avoiding this type of pest problem. The first step is to identify this pest.

**Prevention:**

The best way to prevent a millipede or centipede invasion is through exclusion and eliminating their habitat. Pesticides are NOT effective in combating centipede or millipede problems.

**EXCLUSION**—Most centipedes and all millipedes enter from outside.

- Install door sweeps on all exterior doors.
- Use caulk to seal cracks and crevices around door frames and window frames.
- Make sure there are no entry points around or under doors—particularly sliding doors which do not seal well.
- Examine the building envelope and repair loose or missing siding, brick, mortar, or cement.
- Repair and seal any cracks indoors.

**HABITAT** — It is critical to eliminate the conditions that attract millipedes and centipedes. Most infestations come from an application of mulch that is already infected.

- Get rid of cool, moist conditions inside by fixing leaks and using a dehumidifier in the basement or rooms that are damp.
- Get rid of millipede food sources, such as organic material. Remove dead leaves, excess wood and mulch.
- Exclusion methods will remove the insects that attract centipedes.
- Minimize damp conditions outside by improving drainage and decrease watering.

Technically, centipedes and millipedes are not insects. While insects can be identified by having three body segments and six legs, millipedes and centipedes have a lot more. Both centipedes and millipedes are arthropods that have hard exoskeletal segmented bodies.

**Centipedes:** Centipedes have one pair of legs per segment. In this region, the most common centipede is the House Centipede which is about one to two inches long and has a flat body with about 15 pairs of long legs. While centipedes are fast-moving and can live indoors, they are completely harmless to humans. They prefer cool, moist conditions like compost and basements and they primarily eat insects. Centipedes usually live under rocks, under wood piles, and in compost.

**Millipedes:** Millipedes have two pairs of legs per segment. In this region, the most common millipedes have a dark, rounded, elongated body about one to two inches long or are small and round—known as a pill bug. Millipedes are very slow moving and completely harmless to humans. Unlike centipedes, millipedes eat dead organic matter such as mulch and dead leaves. While they can be found inside, millipedes prefer an outside environment. They burrow in the ground and can be found in cool, earthy locations such as compost.

Both of these arthropods generally live outside but can migrate indoors in large numbers during dry spells or excessive rain.
Centipedes and Millipedes, continued

Removal and Control:

While both centipedes and millipedes can be a nuisance, they are harmless to humans. The good news is that millipedes do not breed inside and do not survive inside without shelter and food (usually dirt or mulch). They will dry out and die naturally within a few days. This means that the only millipedes that are seen are entering from the outside.

Since millipedes and centipedes live and breed in hard-to-reach locations — they only breed in underground nests — pesticides will not be able to kill them at their source and a pesticide barrier will not impact them fast enough to keep them from entering. Once inside, a pesticide spray will kill the pest, but it will not prevent infestations in the future and these chemicals have a high degree of secondary exposure that puts people at risk from the dangers of these toxicants.

If millipedes and centipedes are spotted inside, the best way to remove them is by sweeping or vacuuming them up and placing them in a sealed garbage bag. If pesticide products are applied to speed up the elimination of these pests, least-toxic products, such as boric acid, and diatomaceous earth can be applied. These products do not volatilize and are thus considered least-toxic products. If boric acid or diatomaceous earth has contact with their body, it will dry them out —killing them.

Chemical Profile: Boric Acid

Boric Acid is a LEAST-TOXIC Pesticide and should be the first product used if non-chemical methods of pest control do not work

Boric acid, formulated from a natural mineral, is an effective low-toxic, non-volatile product with insecticidal, fungicidal, and herbicidal properties. It has long been embraced as a safer alternative to highly volatile, synthetic chemical pesticides. Boric acid is especially effective when used as part of an ongoing integrated pest management (IPM) program that incorporates sanitation, cultural, mechanical, and biological practices.

Boric acid was originally registered as a pesticide in the U.S. in 1948. There are currently 189 registered pesticide products on the market containing boric acid or one of its sodium salts as an active ingredient.

Boric acid and its sodium salts, all boron-related compounds, is generally associated with seven active ingredients — boric acid, sodium tetraborate decahydrate (borax decahydrate), sodium tetraborate pentahydrate (borax pentahydrate), sodium tetraborate (anhydrous borax), disodium octaborate tetrahydrate, disodium octaborate (anhydrous), and sodium metaborate.

While exposure to boric acid has been linked to adverse health effects, experts agree that because boric acid noes not volatilize—careful application offers a less hazardous, more effective alternative to many pesticides, without the indoor air problems commonly associated with residential pesticide use.
Use and Mode of Action

Registered in 1983 for control of cockroaches, ants, grain weevils and several beetles, Boric acid and its salts, borates, have been used in medicine as a bactericide, a fungicide, and an antiseptic since the 1860s. It is used as a wettable powder, liquid (applied as a spray or aerosol), emulsifiable concentrate, granules, powders, dusts, pellets, tablets, paste, bait or crystalline rods, depending upon the circumstances and target pest.

As an insecticide, boric acid acts as a “stomach poison” for ants, cockroaches, silverfish and termites, and is most commonly used in a bait formulation containing a feeding attractant or as a dry powder. The powder can be injected into cracks and crevices, where it forms a fine layer of dust.

Insects travel through the powder, which adheres to their legs. When the insects groom themselves, they ingest the poison, which causes death due to starvation and dehydration 3-10 days later. Boric acid can also abrade the exoskeletons of insects. As long as the material is not allowed to become wet, its continuous presence ensures that hatching insects, which pesticide sprays commonly spare, are exposed and die as well.

When used as an herbicide, boric acid dessicates and/or interrupts photosynthesis in plants, or suppresses algae in swimming pools and sewage systems. As a fungicide, boric acid can be used as a wood preservative that controls decay producing fungi in lumber and timber products.

In agriculture, boric acid is used as an insecticide, herbicide and fungicide in food crops and orchards, and borates have also been utilized as a nutritional supplement for boron-loving crops, such as sugar beets and cabbage.

Suggested Products

The following products are all examples of products that contain either boric acid, disodium octaborate tetrahydrate, or Borax as an active ingredient and are effective for the control of ants, cockroaches, termites, millipedes, or centipedes:

- Drax Liquidator Ant Bait
- Gourmet Ant Bait Gel
- Borid®
- Niban-FG Fine Granular Bait
- Terro-PCO Liquid Ant Bait
- Safer Roach & Ant Killing Powder
- Hasta La Vista, Ant!™
- MRF® 2000
- Jecta® Diffusible Boracide
- Boracide®
- CB Borid Turbo PT Perma Dust,
- Pressurized Boric Acid Dust,
- Niban Granules

Effectiveness

An EPA assessment of a boric acid pilot pest control program conducted at the U.S. Army’s Aberdeen Proving Ground in Maryland found that boric acid was both more economical and more effective than monthly spray treatments. A study comparing crack and crevice treatments in conjunction with a full IPM program for cockroaches in school cafeterias found that one crack and crevice application of boric acid reduced roach numbers from 40 per trap to less than three per trap within three months. The low average was maintained for two years by the single boric acid treatment.
Boric Acid, continued

Boric Acid Toxicity

Unlike most pesticides, boric acid does not volatilize into the air and is not associated with the indoor air problems caused from sprays or other pesticide products. Boron exists in water, fruits and vegetables, and background levels even circulate in the human bloodstream. Boric acid’s exposure risks are minimal because of its method of application. EPA considers boric acid as moderately acutely toxic due to acute effects, including oral and dermal toxicity, and eye and skin irritation. There are few allergic responses from skin applications of boric acid; however absorption through skin is negligible unless the skin is broken or burned. Respiratory irritation can occur from chronic inhalation of airborne boric acid or borates. Boric acid is not mutagenic. In chronic studies using mice, rats and beagle dogs, boric acid and borax were found not to be carcinogenic. The EPA has classified boric acid as a “Group E” carcinogen, indicating “evidence of noncarcinogenicity” for humans. While boric acid has a potential to danger humans from chronic unprotected exposure to aerosols, or accidental acute ingestion of large amounts, it is extremely rare that an accidental poisoning of boric acid is lethal.

To avoid accidental exposure, products in a non-spray liquid or gel form a preferred. While boric acid is somewhat slower acting than other materials, it is highly effective over a long period of time. Boric acid should be applied only in areas where it will not come in contact with people - cracks and crevices, behind counters, and in baseboards.

Ecological Effects

Boric acid is practically nontoxic to birds, fish, aquatic invertebrates, and relatively nontoxic to beneficial insects. EPA concludes that boric acid’s limited outdoor use patterns, low toxicity and natural presence in terrestrial and aquatic environments reduce concerns about its impact on non-target organisms.

Sources:

MD H2E’s 5th annual Environmental Excellence in Health Care conference will be held at the University of Maryland School of Nursing November 14th, 2012

Regional and national health care professionals, environmental industry experts, and educators will come together for this learning and networking event designed to showcase innovative and collaborative opportunities and successes. The executive leadership panel, keynote address, and smaller breakout sessions will explore how facilities are working across departments and with community partners, product and service providers, and regulatory agencies to develop, implement, and assess environmental sustainability programs.

Location: University of Maryland School of Nursing, 655 W. Lombard Street, Baltimore, MD 21201

Cost: $55 per person; $30 Continuing Nursing Education: 4.5 Contact Hours available

For More Information: http://nursing.umd.edu/events/environmental/
New Science:

Pesticides in Air a Risk to Pregnant Woman and Unborn Children

A Texas border study has found that air samples in the homes of pregnant Hispanic women contain multiple household pesticides that could harm fetuses and young children. The first study of its kind conducted by the School of Medicine at The University of Texas Health Science Center San Antonio, finds traces of both household and agricultural pesticides that have been linked to disorders such as autism and attention deficit hyperactivity disorder.

The researchers sampled air in 25 households, finding at least five pesticides in 60 percent of the dwellings. Nine other pesticides were identified in less than one-third of the homes. All the women were in the third trimester of pregnancy, when the fetal brain undergoes a growth spurt. Numerous studies have reported birth defects and developmental problems when fetuses and infants are exposed to pesticides, especially exposures that adversely affect mental and motor development during infancy and childhood. This new report is in the summer issue of the Texas Public Health Journal sent to members this week.

The study found 92 percent of air samples contained o-phenylphenol, which is used as a fungicide, germicide and household disinfectant, while 80 percent of samples contained chlorpyrifos, used in agriculture and to kill mosquitoes and other insects. Chlorpyrifos has been well-documented as elevating the risk of brain abnormalities for babies exposed in the womb.

Propoxur, found in such products as granular baits and pet collars, was detected in 76 percent of samples. A 2011 study published in the journal NeuroToxicology found a positive link between exposure to the pesticide propoxur and poor motor development in infants. At the age of two, children exposed to propoxur in the womb experience poor development of motor skills, according to a test of mental development. Propoxur is a carbamate insecticide that was banned in 2007 for indoor uses to which children would be exposed; however, it is still commonly used in flea and tick pet collars.

“Planning for pregnancy today should include not only prenatal vitamins and a good diet, but also avoiding potentially hazardous pesticides. Instead, use non-toxic approaches for pest control and IPM,” said co-author Claudia S. Miller, M.D., M.S., professor in environmental and occupational medicine with the Department of Family and Community Medicine.

Authors of the study recommend managing household pests using defined integrated pest management (IPM), a low-cost strategy to replace the use of residential pesticides. IPM includes least-toxic techniques other than spraying, including sanitation, proper storage and food and water, caulking of windows and doors; installation of door and window screens; and the use of boric acid and diatomaceous earth.

“Once we educate our women of childbearing age about how they can safely and in a healthy manner diminish pests in their homes, they will feel empowered that they can make a difference in their family’s life,” says lead author Beatriz Tapia, M.D., M.P.H., lecturer at the UT Health Science Center — Regional Academic Health Center campus in Harlingen.

Organophosphates, like chlorpyrifos (still used for mosquito control, golf courses, and in food production), are extremely toxic to the nervous system. They are cholinesterase inhibitors and bind irreversibly to the active site of an enzyme essential for normal nerve impulse transmission – acetylcholine esterase (AchE) – inactivating the enzyme. High concentrations of organophosphates have been found in the bodies of pregnant women and children.