

Colorado Coalition for School IPM Newsletter

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Colorado Coalition for School IPM Agency Partner Spotlight: School Nurses and IPM

The Role of School Nurses in Integrated Pest Management for Public Health

By Meredith Swett Walker is a writer for Entomology Today

School nurses do more than just apply bandages to scraped knees and administer asthma inhalers. They are also health educators, they help control communicable diseases, and they even do some pest management.



In the past, the dreaded head louse (*Pediculus humanus capitis*) was likely the only pest a school nurse needed to worry about. But, with the rise of arthropod-borne diseases like Lyme disease, West Nile, and Zika, nurses increasingly find themselves

thinking about tick and mosquito control as well.

Bed bugs, meanwhile, are also cause for concern, and as head lice evolve resistance to traditional insecticidal treatments, even these pests require more sophisticated control methods. But school nurses typically haven't received training in pest ecology or integrated pest management (IPM.)

At Entomology 2017 in Denver, Kathy Murray, Ph.D., of the Maine Department of Agriculture, Conservation, and Forestry presented her work with the Northeast School Integrated Pest Management Working Group to engage school nurses in IPM for public health pests in schools. This project aims to give school nurses the tools, resources, and training that they need to promote and support IPM policies in schools. The work was endorsed by the National School Nurse Association and supported by the Northeastern IPM Center.

In the last 15 years, many states have started requiring schools to practice IPM. This may seem odd, but a school campus is essentially a large public property, and any property, be it a building or open space, has pests. Usually, IPM efforts in schools focus on facility managers or custodians. But school nurses deal directly with the effects of these pests on students and can be an important addition to the IPM team.

In many public schools, resources are spread thin. Facility managers may not always have the budget for the labor or materials necessary for effective IPM. But when facility managers and nurses come together to ask administrators or school boards for more resources for IPM, their requests have more heft, says Murray.

In the Northeast, ticks are a major concern, particularly *Ixodes scapularis* (also known as the blacklegged tick or the deer tick), which transmits Lyme disease. Students may come in with ticks they picked up at home



or can even pick up ticks on the school grounds. The project supplies school nurses with a tick removal tool, as well as actual ticks embedded in Lucite to aid in distinguishing disease-carrying species from non-vectors. When nurses learn more about tick ecology, they can help identify potential tick habitat on campus and work with facility managers to get it removed.

Mosquito bites themselves are not a major concern for school nurses, but arboviruses like Zika or West Nile are. When nurses know more about the behavior and ecology of mosquitoes, they can help identify mosquito breeding sites on campus, such as small pockets of standing water, and work with facility managers to address them. Where arboviruses are a serious concern, nurses may advocate for outdoor sporting events to be scheduled to avoid peak mosquito activity periods like dusk.

Murray found one health-pest relationship that many nurses were unaware of: the connection between cockroaches, mice, and asthma. The fecal material and urine of these pests are potent asthma triggers. Unfortunately, schools are a prime habitat for mice and roaches. There is food present in the cafeteria and often the classroom. In addition, school buildings are typically unoccupied at night, when mice and roaches are most active. Some research has even shown higher levels of pest-related allergens in school buildings than in the average student's home. If nurses are concerned about asthma attacks at school, managing pests may help.

In her presentation at the Entomological Society of America's 2017 annual meeting, Murray made the case that school nurses are often at the front lines of pest-related public health challenges. They can also be essential bridges to the wider community. When confronted with a pest problem, "nurses would like to have some solid, research-based, concise information—in multiple languages" that they can share with students' families. The IPM project is working to provide that. While some school nurses may have never envisioned IPM as part of their job description, Murray says she has found the school nurses she works with to be interested in IPM and "very passionate about protecting student's health."

Tick specimens embedded in Lucite can help school nurses distinguish disease carrying ticks like *Ixodes scapularis* from other species. Nurses are also provided with a tick removal tool with a web address directing them to online IPM resources for schools. (Photo credit: Kathy Murray, Ph.D.)

The Northeast School Integrated Pest Management

Working Group has presented its project to engage nurses in IPM at nursing conferences. (Photo credit: Kathy Murray, Ph.D.)

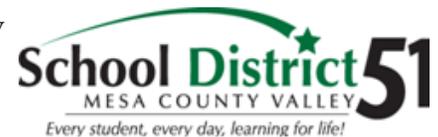
Special thanks to the Entomological Society of America for permission to reprint this article.

CCSIPM Spotlight: Mesa County Valley School District

Mesa County Valley School Districts 51 Begins the Implementation of Integrated Pest Management Program

By Clyde Wilson, Assistant Regional School IPM Coordinator - EPA

Mesa County Valley School District 51 in Grand Junction, CO becomes the 17th Colorado



School District to initiate the implementation of the School Integrated Pest Management Program. The District is home to 22,105 students, according to Colorado Department of Education 2016 – 2017 school year statistics, and is the 12th largest school district in Colorado. In August of 2017, the initial baseline assessments were conducted in Mesa County Valley School District 51 by an assessment team that was under the supervision of Charles Pope, Environmental Health and Safety Manager for the district, and included Environmental Health and Pest Management Specialists from the Mesa County Health Department, Colorado State University, and the U.S. Environmental Protection Agency.

In 2011, the Department of Health and Human Services, the U.S. Environmental Protection Agency and the U.S. Department of Education began collaborative efforts to accelerate the adoption of Integrated Pest Management Program in U.S. schools, to create healthier school environments for students and staff, and mitigate unnecessary and often times, excessive exposures to pesticides in the school environment.

Students in particular are at greater risk for adverse effects from chronic exposures to pesticides in the school environment, because of the amount of time that they spend in the school setting weekly, and because they are uniquely vulnerable to exposures

to chemicals and pesticides that may be endocrine disrupters and cancer causing agents, or probable carcinogens.

Chronic exposures to certain chemical compounds are particularly concerning for children and adolescents since they do not have fully developed endocrine systems that would allow the body to process some of the chemical exposures and excrete them from the body.

Many of the pest that children are exposed to in the school setting are also potent triggers of Asthma episodes. Cockroaches and mice are quite common and perhaps the most common pest found in schools and are both considered potential potent Asthma triggers.

The use of Integrated Pest Management strategies in schools creates healthier environments for students, teachers and staff. Through the use of this approach, food preparation areas are cleaner, bacteria are reduced, the spread of viral pathogens is limited, and the unnecessary exposure to pests and pesticides is reduced. IPM also reduces allergens, which can trigger asthma symptoms or contribute to the onset of asthma.

- Nearly 10 percent of children in the United States have asthma, and 80 percent of their asthma is caused by allergens.
- Thirty-seven percent of children with asthma in the United States are allergic to cockroach allergens. Children who are allergic to these cockroach allergens also are more likely to require medical attention for asthma-related issues.

Integrated Pest Management (IPM) is a science based strategy that addresses pest issues before they arise, reducing pest presence through preventive measures. IPM takes advantage of all appropriate pest management strategies and controls pest populations by removing their basic survival elements—such as food, water and shelter—and by blocking access to facilities where these items might be readily available

IPM is a Proven Solution;

IPM isn't just a good idea: It's a science-based approach to controlling pests that works. In a study of three school districts in North Carolina, researchers found—

- Schools implementing IPM practices reported decreased pest presence compared to those implementing conventional calendar-based pest management practices.

- In schools with IPM programs, 14 percent of dust samples had detectable pest allergens compared to 44 percent of dust samples from schools with conventional pest management programs.
- Schools implementing IPM methods used 99.9 percent less active pesticide ingredient than schools using conventional pest management methods.

By implementing IPM practices, schools can reduce pest presence and related allergens and asthma triggers, thereby improving student and staff health, increasing student attendance, and potentially boosting school funding while addressing health disparities.

When asked about his experience with managing pest populations in the school environment and the district's decision to focus on the implementation of the School Integrated Pest Management (SIPM) Program, Charles Pope offered the following comments;

It is critical that we protect the health and safety of our students and staff. The District's Administration is fully committed to working with the EPA, Mesa County Health and Colorado State University to integrate IPM practices to reduce the use of pesticides in our schools and administrative facilities.

Prior to our baseline assessment, we had directed building staff to lock food items in plastic seal tight containers, address clutter and housekeeping issues, and to utilize good sanitation practices.

Staff and contractors were prohibited from using rodent pesticides in our buildings. Instead, snap trap use was encouraged to control mice. When addressing cockroach control, we routinely used pesticides while students were out for winter, summer and spring breaks. Custodians used the "Work Order" system, to have maintenance staff install exit door sweeps and seal openings along foundation walls.

The baseline assessments clearly indicated that there was a need for continuing improvements in creating a healthier environment in our facilities. Cockroaches were a significant problem in some locations, and was common in many classrooms where excessive boxes, paper, books and other clutter was found. This is clearly an indication that we need to do more to reinforce our existing practices and implement additional measures to eliminate clutter which serves as harborage sites for pest, and eliminate available food sources for pest in our facilities.

Previously, we had no formalized policy to enforce

these practices. With the assistance of EPA, the Mesa County Health Department and Colorado State University, we will write and implement a School District IPM policy with the assistance of our District Administrative Leadership, to reduce the use of pesticides in our buildings and in our outdoor environments, thus creating a district-wide environment with a focus on improving the health and safety of our students and staff.”

Featured Pest of the Month: Indian Meal Moth

The Indian Meal Moth

The Indian meal moth (*Plodia interpunctella*) is a small, grayish-brown the most common household moth that can reproduce in Colorado homes. It develops as a pest of various foods commonly found in pantries. The caterpillars can seriously damage susceptible food items and the adult moths can become annoying as they fly through the home.

All stages of the Indian meal moth may be found in homes. The adult is a small moth, about 3/8 inch long with a wing span of about 5/8 inch. The overall body color is generally dirty gray but the tip half of the wing is rusty brown or nearly bronze. This wing marking pattern allows Indian meal moth to be easily distinguished from other household moths.



Figure 1. Adult Indian meal moth. (Photo from the K. Gray collection.)

The caterpillar stage is usually cream colored, sometimes with yellowish-green or pinkish shades, and has a dark brown head. Normally they stay associated with foods, but the full grown caterpillars, about 2/3 inch long, may be seen as they wander in search of a place to pupate.

Life History and Habits

Indian meal moths develop in many kinds of stored foods. Coarsely ground grains and cereal products are commonly infested. Dried herbs, dried fruits, and nuts are also highly favored. Pet foods such as dried dog food, flaked fish food, and bird seed can also become infested. Indian meal moth may also breed in ornamental items made of dried flowers or seeds.

The moths usually fly at dusk and through the night. Females lay tiny eggs (ca. 0.5 mm) on or near potential food items. The newly hatched caterpillars



Figure 2: Indian meal moths cause problems on dried food products in the home. Adult and larvae shown.

and thin cardboard.

The rate of development is dependent on factors including temperature and food quality. Under optimum temperatures the caterpillars may become fully-grown in as little as a month; development typically requires a much longer period. When feeding is completed the caterpillars usually wander from the food and search for a place to pupate. They then create a loose cocoon covering within which they pupate and subsequently transform to the adult stage. Cocoons are most often located in cracks or confined spaces, such as the junction between walls and ceiling.



Figure 3. Full-grown larva and pupa of Indian meal moth. (Photo by W. Cranshaw.)



Figure 4. Indian meal moth larva. (Photo from the K. Gray collection.)

(larvae) seek out foods and begin to develop. As they feed they often produce silk that loosely binds to food fragments. In large, undisturbed containers feeding is concentrated on the surface as the larvae do little burrowing. However, caterpillars may occur throughout the product within small, loose packages typically found in household pantries. The caterpillars are capable of chewing through plastic bags

The adults emerge, mate and lay eggs. Since the moths do not feed they usually survive little more than a week. During this time the female may deposit over 200 eggs, laid either directly on food or in crevices adjacent to the stored foods on which they feed.

Probably three or four generations can be completed annually in a Colorado home although all stages may be present as generations overlap. For reasons that are unclear, adults are usually observed most commonly from November through February.

Management of Indian Meal Moth

The first, and most critical, step is to identify all sources of infestation. The presence of some webbing is usually the most effective way to determine which items are infested.

This examination must be thorough as the range of materials potentially infested is so broad. First go through items in the pantry which may host Indian meal moth. They are commonly found in coarse cereal products (e.g. oatmeal, breakfast cereals), nuts, herbs and spices, dried soups, dried fruits and vegetables. Pay particular attention to items that have remained in the cupboard for long periods. Foods that are loosely sealed or are in thin wrapping are more likely to be infested than materials in insect resistant containers such as hard plastic or metal.

Indian meal moth may also be found in other materials around the home. Dried dog food and bird seed should be checked. Dried flowers and some craft items that include seeds may be infested. Areas where flour and other materials used in baking may have spilled can support Indian meal moth. Larvae are also known to occur in the stored caches of seeds and nuts that squirrels and other rodents may have around the home.

Infested material should be immediately discarded, used up, or somehow treated to disinfest. Treatments involve using heat or cold to kill any larvae and eggs that may be in the food. Cold treatment requires putting infested items in deep freeze for at least two or three days. Effectiveness of cold treatment may be improved by alternating freezing treatments with rewarming to room temperatures for a few days. High temperature treatments involve oven heating at around 120 to 140 degrees F for 20 minutes (Somewhat longer intervals are needed if treated items are bulky, requiring longer periods to raise internal temperatures.). Injury to the food is possible with excessively high temperature treatments.

Since insects also can develop on spilled food, thoroughly clean areas where food was stored by vacuuming or sweeping up all spilled food. The thoroughness of the cleaning is important primarily to eliminate food for surviving insects to feed on. The nature of the cleaning agent (soapy water, bleach, etc.) is less important than the permanent elimination of the food.

Heat or cold treated objects are capable of being immediately reinfested as long as Indian meal moths remain in the home so extra care should be taken during this stage. Although adult moths may only live for a week or so, larvae that have recently pupated in hidden areas of the home may also be a potential source of reinfestation.



Figure 5. Indian meal moths captured at pheromone trap. (Photo by W. Cranshaw.)

Therefore Indian meal moths must be denied access to all food sources for the length of time that is required to complete the pupal stage plus how long the adult life span can be. A month should be adequate to cover this period.

In the interim, susceptible food items must be stored to prevent reinfestation. Place foods in tightly sealed containers. Food also may be stored in the refrigerator or outdoors until the moths have died out.

Although Indian meal moth can be eliminated, reinfestation are always possible through accidental reintroductions on infested food. Consideration should be given to how bulk foods are stored. Bulk seeds and other commonly infested foods (e.g., bird seed, dog food) should be stored in outbuildings away from the pantry area. Foods in pantries should be stored in containers that are tight-fitting enough to prevent entry by the minute early stage larvae and must be thick enough to prevent it being penetrated by the chewing of late stage larvae.

Use of insecticides within the pantry area is not recommended and will normally give little, if any, additional control in the absence of a thorough clean up and treatment of infested materials. Some household insecticide may allow crack and crevice treatments near food storage areas, but these must be restricted to these site. Never apply insecticides in a manner that allows direct contact with food, food preparation surfaces or food utensils.

There are available traps for Indian meal moth that are baited with an attractant known as a sex pheromone. This is the chemical used by the female Indian meal moth to attract males. Such traps are very useful for identify "hot spots" of infestation. However their ability to control Indian meal moth is highly doubtful, despite occasional claims to this effect by suppliers. This is because the traps only capture males, and usually only a fraction of these. As mated females are not captured, they will continue re-infestation.

Source: Indian Meal Moth by Whitney Cranshaw, Department of Bioagricultural Sciences and Pest Management, Colorado State University.

Current Pests: What Are You Seeing?

Arapahoe, Douglas, & Elbert Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Denver Metro Area

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Eastern Plains Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

El Paso & Teller Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

High Country Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Northern Front Range

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Pueblo & Fremont Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Southwestern Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Tri-River Counties

Household Insects

Indian meal moth: Adults are most commonly observed flying about homes during early winter.

Fungus gnats: Adults begin to be observed around windows and around the soil of potted plants where they originate.

Boxelder bugs, conifer seed bugs, multicolored Asian lady beetles: Overwintering adults continue to be active in and around homes during warm days.

Fruit flies: Flies from overripe fruit continue to be present in homes.

Source: <http://bspm.agsci.colostate.edu/outreach-button/insect-information/> (Yard/Garden Insect Calendars)

Credits

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