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COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION
SERVICE**

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Project Type: Regional IPM Publications

Three-fourths of the households in the Northeast region use pesticides to deal with pests in their homes, lawns, and gardens. And developing IPM outreach and resources for homeowners, retailers of pest management products, and multipliers is the number one priority of many stakeholder and advisory groups in the Northeast. Yet it is difficult for the Northeast's 54 million residents—and the master gardeners, Extension educators and garden retail employees who advise them—to find accessible resources that provide sound IPM solutions to pest problems. We will build on a 2005 NE IPM grant to produce *IPM in and around the Home—Northeast Guidelines* (working title) for which the writing and editing is largely complete and the review process begun, but which included no production funding. Now we will:

- Complete final draft of the guidelines.
- secure suitable photos and graphics,
- lay out the text and graphics for the book, and
- send production-ready files to publisher, edit page proofs, and produce and distribute 2,000 copies.

Key to making this book competitive with other homeowner references will be the use of top-notch graphics matched with a conversational, friendly style and tone. Sales will be our best yardstick to measure how consumers value and use this information. We will also survey master gardeners in the Northeast to determine the book's usefulness to them in advising their constituency.

4. Project Description

a. Problem, Background and Justification

Three-fourths of the households in the Northeast region use pesticides to deal with pests in their homes, lawns, and gardens. According to the EPA (2004), 90 million pounds of conventional-pesticide active ingredients were applied to homes and gardens in the United States in 2001-2002. In New York alone, thousands of products are registered for residential use: 747 for the home garden, 1,335 for household use, 1,123 for turf and ornamentals, and 311 for structural pests (PMEP 2006). A recent survey of urban apartment dwellers by the New York State Attorney General's Office found that, statewide, 69% of respondents applied pesticides in their own homes and 33% did so at least once a week (Surgan et al. 2002). It is likely that other Northeastern states show similar rates of use.

Unfortunately, it is difficult for the Northeast's 54 million residents to find resources that synthesize, index, and package IPM solutions to their pest problems in ways that are easy to read and use. The few guides that do exist are usually heavily pesticide oriented, or written in a dry, academic style that is unappealing to the consumer and doesn't compete well with commercial books. Extension educators, master gardeners, and garden center employees also lack suitable references for resolving consumers concerns and providing sound IPM advice.

In 2005 we received a Regional IPM Grant Award from NE IPM to produce *IPM in and around the Home—Northeast Guidelines* (working title). This guide will be a major resource for millions of homeowners as well as the master gardeners, Extension educators and garden retail employees that advise them. It will compete with other popular books that are not IPM-based; many, in fact, are industry and product-oriented. Although our guide comes from an independent university perspective, it goes far beyond the former guidelines available in some states and is written in a reader-friendly, easy-to-use format lacking in other guides—while retaining accuracy and an IPM orientation. The production of these guidelines for the Northeast is well justified, as validated by the NEIPM funding we have already received. Unfortunately, the project did not include a production budget. In order to be able to complete the project and print and distribute the guide through the Northeast, we are seeking additional funding.

Needs identified by stakeholders in the Northeast Region

In 2005, the Community IPM Working Group for the Northeast Region revised its priorities <http://northeastipm.org/work_commpriority2005.cfm>. The introduction to the new priorities states: “the most important focus within all the areas covered by the Community IPM Working Group is “**IPM in residential settings**”. One of their three specific priorities within residential IPM is “Outreach: Develop and create an outreach campaign for residential IPM. Develop material and distribute to end-users. Measure success of project.”

Furthermore, participants in the Community and Urban IPM Conference that was held in Manchester, New Hampshire on March 15-16, 2005 voted on priorities. Close to 200 people

attended this conference and all were asked to submit what they considered the most important issues in Community and Urban IPM. Their suggestions were aggregated, and the same group voted on which issues were most critical to address in the immediate future. The number one issue was: “Education/Outreach—Develop IPM outreach to homeowners, retailers of pest management products, and multipliers.” This same priority was ranked #1 by the Northeastern IPM Center's advisory council, state network project leaders, IPM working group leaders, and state IPM Coordinators and other NEREAP members in a November 2004 poll <<http://northeastipm.org/priority/2005/generalpriorities.htm>>. The guide we are developing directly addresses this priority. It will be a tremendous resource that will impact homeowners both by the advice they receive from master gardeners and retailers, as well as what they read and implement on their own.

Previous resources funded by NE IPM

Most notable is our project to produce these regional guidelines, funded by NE IPM in 2005 as discussed above. We need funds to complete the project at a high quality level and to print the book—funds for which were not included in the previous project. Other projects include a 1998 NE IPM Regional Grant to Malinoski, Traunfeld, and Clement for *A Diagnostic, Problem-Solving Web Site for Plants, Pests, and Landscapes*, from which the Home and Garden Information Center was more fully developed. Two years prior, Maynard, Casagrande, Gold, Gordon, and Lagerquist received funding for “Selling the nursery industry on sustainable trees and shrubs.” *IPM in and around the home: Northeast guidelines* will complement the information developed in these projects, both geographically and conceptually.

Applicability of our project to other states

Every state in the country will be able to benefit from the information in *IPM in and around the home: Northeast guidelines*, but the focus will be the north-central portion of the Northeast Region—Pennsylvania, New Jersey, New York, Connecticut, Massachusetts, Rhode Island, New Hampshire, Vermont, and Maine. Approximately 54 million people live in these nine states (Pearson Education, 2002-2004) and most of them encounter pests in and around their dwellings on a regular basis, creating an enormous potential audience for guidelines on pests and their management.

Following are excerpts from letters of support that were submitted with the previous grant proposal from cooperators:

From Pennsylvania, Ed Rajotte wrote: “Having this information gathered into one publication and web site ... will be an invaluable resource.... We look forward to being a member of the team that develops valuable resource materials for homeowners....”

From Massachusetts, Robert Childs wrote: “...I believe there is a strong need for such information in my state as well as the other New England states. ... I look forward to

working with you on this much-needed publication.”

From New Jersey, George Hamilton wrote: “[IPM guidelines for homes and grounds] on a regional basis would go a long way toward increasing the awareness and adoption of IPM around the home by landscapers, pest control operators, and the general public.”

From New Hampshire, Rachel Maccini wrote: “This project will be very valuable and cannot be overstated. [It] will do much to educate our citizens and to conserve our environment by the reduction of pesticide use in our state.”

Strengths of proposed guidelines

IPM in and around the home: Northeast guidelines will be available in printed and web formats and will cover IPM methods as they relate to pests of structures, houseplants, trees, shrubs, small fruits, vegetables, turfgrass, annuals, perennials, and wildlife. Strengths of the guidelines as discussed in the original proposal include: free internet access, multistate involvement, non-pesticidal tactics, training in environmental stewardship and risk management, and a high likelihood of IPM implementation by end users.

IPM in and around the home: Northeast guidelines is expected to be approximately 200 pages with a color cover and a minimum of 12 pages of color photos. Key to making this book competitive with other references available to homeowners will be the use of top-notch graphics and photos, matched with an accessible, friendly prose style and tone. The illustrations not only make the book attractive to readers considering purchase of the book, but are also essential in leading the user to accurate identification of pests, beneficials, plants, symptoms and damage—a critical early step in IPM. The friendly tone will attract readers who find other references too daunting or dull. The existing publication looks like an academic manual and would benefit from a user-friendly color cover and a more compact format. We will also attend to details such as the inclusion of an ISBN number and UPC (universal price code) label that will make it easier for a bookstore, garden center or home improvement store to carry the guide.

Here’s an excerpt from the introduction:

IPM Answers to Fixing Problems in Your House and Garden

When I was invited to work on this book, I knew it was important. I’m a gardener, mom, and homeowner, and when pests show up in my house or garden, I am curious about them—but mostly I want to make them go away. I also care about the environment, and speak with audiences all over the Northeast about nature and gardening—and the conflicts between them. Managing a Cooperative Extension “Master Gardener” program, answering questions on TV, and consulting in people’s homes and backyards, I’ve heard hundreds of times how you want straightforward advice. You want to know what’s the real problem, whether it’s fixable and worth doing, and what to do to solve it. And you would like to do that as easily and cheaply as possible, without hurting your world. That’s why I am writing these chapters.

This book is for people with a home or apartment and yard or garden, whether you simply want a safe and attractive landscape and house with the least trouble or are an experienced gardener. It's also for landscapers, nursery or garden center staff, and Extension educators who try to help consumers with pest problems. The goal is to solve problems, do no harm, and keep your plants and household healthy.

What Kinds of Problems?

Inside, there are wasps in the bedroom, moths in the pantry, holes in the sweaters—and centipedes run out from under the houseplants.

Outside, the maple tree looks sick, the *Astilbes* are drying up, and both the roses and tomatoes have suspicious-looking spots on the leaves. And the soil is so hard that gardening is nothing like it looks on TV shows (not to mention the weedy lawn...)

What do you do, and where do you start? ...

Please view Appendix A for a description of the chapters, and Appendix B to see a sample of the layout and design style.

Here we present a few early returns from New York Extension educators who saw a sneak preview:

Dave Chinery, Cornell Cooperative Extension of Rensselaer County, wrote:

Wow! I am very impressed with what has been written for the new NE IPM Guidelines! I read through some of it and at first I must admit I wasn't sure about the "friendly" sort of tone of the writing—aren't Cornell and the other universities supposed to sound "authoritative?"—but then I read your comments about competing with other publications and being user-friendly to the intended audiences, and I was won over. I think people will actually enjoy reading this publication, and that should help it sell and be used. All of the illustrations, text in sidebars and boxes, and other goodies will make it informative and fun to use, too. I think you should be very pleased at how well this has turned out so far!

Cheryl Hearty, Cornell Cooperative Extension of Dutchess County, wrote:

I have to admit, at first I was afraid this publication would be more fluff, less practical info. (Bulletin 74 [the previous NY guidelines] is such an important resource to us) I was wrong! I cannot believe the level of detail you have included in the sample pest chapter. Bulletin 74 only tells you what to do once you have identified the problem. This book combines all the information of our reference books into one location. What you have compiled is amazing. It will be invaluable both for homeowners who purchase and for master gardeners who use it to give advice.

Ann Hazelrigg, Plant Diagnostic Clinic/PESP Coordinator

I read the introduction and insect chapter and am really impressed! I think this book will be really helpful. It seems straightforward as to the pest information, and very readable for a homeowner/gardener.

It is important to note that printing costs were not covered in the original grant. In order to fulfill

that grant's objectives, we are requesting funds to print 2,000 copies of the books. Proceeds from sales of this initial printing will fund future print runs. Other possible financing for future printing could come from individual states, organizations, or private sponsors. Initial success with sales and market penetration may also generate interest from a publisher such as NRAES (Natural Resource, Agriculture, and Engineering Service), Timber Press, Elsevier Science, Krieger Publishing, Storey Publishing, Yankee Books, or the like, who might purchase reprint rights and list this book in their catalogs.

b. Objectives and Anticipated Impacts

Objectives:

1. Complete content, incorporate NE reviewer comments, and edit final draft of the guidelines.
2. Secure suitable photos and graphics.
3. Lay out text and graphics for book.
4. Send production-ready files to publisher; edit page proofs; produce and distribute 2,000 copies.

Anticipated impacts:

Publishing this high quality, IPM-promoting resource will fulfill the objectives of the original grant: *IPM in and around the Home—Northeast Guidelines* (Koplinka-Loehr and Klass, 2005¹).

The objectives were stated as:

- provide readers with clear, current, and reliable information on pests and pest management on a continuum from nonpesticidal tactics to conventional (nonrestricted) pesticides.
- build consumers' ability to make informed choices confidently and to find additional information;
- increase broad use of IPM methods among NE consumers; and
- decrease the negative environmental impacts of conventional pest management.

Putting this valuable resource in the hands of thousands of homeowners throughout the Northeastern U.S. and those who advise them will have a tremendous positive impact on residential pest management. We expect people to change their pest management behavior and act in better accordance with IPM principles as a result of consulting this book or advisors who are using this book.

¹ Principle investigation of this grant was transferred to J. Grant and C. Klass after C. Koplinka-Loehr left the NYS IPM Program.

c. Approach and Procedures.

1. Complete content, incorporate NE reviewer comments, and edit final draft of the guidelines.

A writer/project manager (Sally Cunningham) and a writer/editor (Bridget Meeds) have been employed. The writing and editing is largely complete, and the review process has begun.

Cunningham is a writer and former Extension educator who is steeped in the values of IPM. She wrote *Great Garden Companions* for Rodale Press and has contributed chapters to five other books published by Rodale or Yankee Books. She also writes a weekly column for *The Buffalo News* and appears often on TV gardening programs. During her time with Extension, Cunningham chaired the statewide steering committee for consumer and community horticulture and established Erie County's master gardener program, voted among the top three in New York despite having the lowest staff to volunteer ratio. Cunningham is a certified nursery professional and has well-developed relationships with regionally and nationally known gardening and Extension professionals.

Meeds has 15 years of experience consulting in marketing, public relations, writing, and editing. In addition to her writing and editing skills, she's a self-described "gardening idiot." Meeds makes certain that descriptions and explanations make sense to the reader who doesn't know an ant from a termite or a wasp from a bumblebee.

Dozens of resources, as well as the wealth of Cunningham and Klass's experience, are being mined to create the content. Cunningham and Meeds bring a warm, approachable voice to the writing and have framed the comprehensive IPM information in a, reader-friendly format that makes good use of charts, sidebars, and boxes to organize maintain, and augment the quality of the content.

A team of land-grant IPM experts from Pennsylvania to Maine is reviewing the manuscript. That committee is now receiving chapters in draft form. All comments and suggestions are recorded and many incorporated; all receive a response. Writer Sally Cunningham will solicit specific experts for intensive content review as topics emerge.

2. Secure suitable photos and graphics.

Many high-quality photos and graphics are available through University and private sources. However, it takes time to locate them and secure permission for use. We will rely heavily on this lower-cost method of obtaining illustrations. A part-time student or technician will be employed to search for designated illustrations and secure permission for use. On occasion it will also be necessary to pay for photo or illustration rights, a photo shoot, or creation of an appropriate graphic.

3. Lay out text and graphics for book.

Proper layout and design are necessary to present the book content in well-organized, attractively arranged sections that are both easy to read and informative. Strategic placement of sidebars, tables, and illustrations—so that they align with the text they illustrate—will also be fundamental. A design/layout specialist will be employed to perform these tasks.

4. Send production-ready files to publisher; edit page proofs; produce and distribute 2,000 copies.

The writer/project manager, in cooperation with the design/layout specialist, will submit the final copy to the publisher. The lowest bid, reputable printer/publisher will be contracted to produce 2,000 copies of the book.

d. Evaluation Plans

Our goal is to increase the practice of IPM in and around homes in the Northeastern U.S. by providing consumers and their advisors with a highly useful IPM resource that is easy to read and understand. To directly measure implementation would require a massive evaluation project that would usurp the budget of our proposed work. In lieu of such an extensive measurement, we will evaluate the success of our project in two ways.

1. Book Sales

If the first printing of 2,000 books sell out in the first 12-18 months on the market, we will consider that a good indicator of success. It would show that consumers value the book enough to purchase it—a sign that they also value, and hopefully use, the IPM information contained within the book.

2. Master Gardener Survey

Master Gardeners in the nine targeted northeastern states are expected to use the book as a resource when responding to consumer pest inquiries. We will survey at least 50 master gardeners in three large states and at least 25 in a minimum of three smaller states to determine the usefulness of the book in their work and their perception of its influence on homeowner practices. Results will be conveyed in our final report.

e. References

EPA. 2004. Pesticide industry sales and usage: 2000 and 2001 market estimates. T. Kiely, D. Donaldson, A. Grube. Publication # 733-R-04-001.

<http://www.epa.gov/oppbead1/pestsales/index.htm>

Pearson Education, 2002-2004. <http://www.factmonster.com/ipka/A0004986.html>. Source: U.S. Census Bureau, Census 2000; 1990 Census: www.census.gov.

PMEP (Cornell University Pesticide Management Education Program). PIMS database, <http://pmep.cce.cornell.edu/pims/current/>, and 12/5/06 personal communication with William Smith.

Surgan, M., T. Congdon, C. Primi, S. Lamster, and J. Louis-Jacques, 2002. Pest Control in Public Housing, Schools and Parks: Urban Children at Risk. Environmental Protection Bureau of the NYS Attorney General's Office.

5. Cooperation and Institutional Units Involved

The work described in this proposal will be conducted at Cornell University under the supervision of the principle investigators, Jennifer Grant and Carolyn Klass.

6. Key Personnel description and curricula vitae (CVs)

Jennifer Grant is an assistant director, as well as coordinator of Community IPM, for the New York State IPM Program, Her main function will be to provide administrative oversight for the project. She is also a contributing member of the planning and production team, and serves as a content reviewer.

Carolyn Klass is a senior extension associate and director of Cornell's insect diagnostic lab, in the Department of Entomology. She has been the lead author and editor of *Miscellaneous Bulletin 74: Pest Management Around the Home, Pt. I Cultural Methods, and Pt. II Pesticide Guidelines* (the new guide's predecessor) for 30 years. She is a primary member of the planning and production team and directs, reviews and approves the technical content of the new guidelines.

Mary Woodsen has been a science writer for the NYS IPM Program since 1999. She provides editorial oversight for the project.

10. Attachments

Appendix A: Chapter Descriptions

IPM in and around the Home—Northeast Guidelines (working title).

The IPM Mindset

When you approach pests or plant problems with an IPM mindset, you carry an entire toolbox with you. First you diagnose, figuring out exactly what's happening—often cultural or environmental conditions have set up the pest problem. Then you open the toolbox and find a series of solutions... scouting, prevention tools (barriers, traps and repellants), resistant species, well-timed hosing, or picking off the pests. (Pesticides are an option—but far from the main tool!) You get smart about employing *biological controls*, such as predatory insects and nematodes, B.t. (*Bacillus thuringiensis*, a caterpillar control). And you set up your house, garden, or landscape in order *not* to have problems in the first place.

Common Pests Inside and Around the Home

The most-asked consumer questions are often about very common insects: the ants, wasps, mosquitoes, flies, fleas, and beetles that you see in and around the house. If you have seen moths in the kitchen, carpenter bees drilling into the new deck, or worried about a hornets' nest—this chapter is for you. We'll help you decide whether the visitor is a big problem or just passing through, and what to do.

Houseplants

In the Northeast these indoor plants are a little bit of nature we keep going all year, and it's frustrating when they develop sticky scales, cottony mealybugs, rotten roots, or just look sickly. Let's sort the serious from minor problems, and prevent most of them in the first place.

Flower Gardening

Growing flowers is one of the nation's biggest hobbies, and you have hundreds of plant choices—perennials, annuals, and bulbs, including some tropical plants, roses, and herbs. This chapter reviews healthful garden care, and the all-important site and soil factors. If you have a problem, you can look at a list of clues—signs and symptoms found on leaves, stems, and flowers—to start the diagnosis. Or you can review a list of over a hundred *Flowers and their Frequent Problems* to see typical cultural, disease, and insect problems of each one. Finally you can go to *Managing Problems in the Flower Garden* for tools and techniques to solve them.

Vegetables

Vegetable gardening problems don't occur in a vacuum, and pest management isn't just a matter of naming and killing a pest. Here we present the vegetable garden as a whole system, starting with important site and layout choices. Then going plant by plant (arranged in families or groups

of plants with similar needs), we'll review the problem solving process, starting with prevention.

Trees and Shrubs

Our largest plants have the biggest impact—on real estate value, and often quality of life, not to mention the cost of purchasing or maintenance. So it's important to choose suitable trees and shrubs, place and plant and tend them properly, and then to know what to do if something goes wrong. This chapter is your "Owner's Manual," designed to help you make tree and shrub selection and care decisions. Use the list of trees and shrubs available today to discover their *Frequent Problems*—some unique to a species; others common to many ornamentals. Then see the chart *Managing Problems of Trees and Shrubs* for guidance in solving your problem.

Fruits

Not everybody has an orchard, but lots of people still have an apple tree, some raspberry bushes, or just a few grapes on a trellis. Here we'll review the basic needs, common problems, and pest management solutions for all kinds of fruits grown in the Northeast. With many new, pest-resistant cultivars on the market, you may be surprised how many beautiful fruiting plants you can grow quite easily.

Lawns

More U.S. homes have lawns than flower gardens, and lawn care represents the biggest single category in home landscape or garden expenses. Lawn care also has huge environmental impact, so it's important we make informed decisions about our home lawns—including site preparation, choosing our grass seed, how we cut the grass, kill weeds, and fertilize. Use this chapter to prevent lawn problems or solve them when they arise.

Weeds

Weeds are everywhere there are gardens, sometimes even in the cracks of the sidewalk. Some weed management is specific for some kinds of gardens, so see *Garden Layout* in Vegetable Gardening, and *Prevent Weeds/ Use Mulch* in the tree and shrub or flower gardening sections. Here, learn to distinguish annual weeds from perennials, identify the most common culprits in the garden or landscape, and see how to prevent or minimize the never-ending battle with weeds.

Wildlife

Although we love many of them, and feel compassion for others, wild animals can also wreak havoc on our yards or gardens. This chapter helps you understand why you may have bats in the attic, moles in the lawn, squirrels dislodging bulbs, and deer eating the shrubs—and what to do to prevent or manage wildlife.

Understanding Pesticides

While they are only one component of the IPM toolbox, pesticides play a huge role in how pest are managed today in agriculture and horticulture, as well as around our homes and communities. Pesticides have huge importance because of their health and environmental impacts, particularly if they are used incorrectly or carelessly. This chapter reviews the kinds of pesticides, how they work, and how you choose and handle them. In this section we offer a listing of pesticides

labeled in the Northeast for common pests (insect, disease, and weed), with advice on selecting and using them. Since pesticide laws vary state by state, and products are added or removed from the market frequently, you must check with your state or county for applicable regulations and product availability. Since the list of pesticides, and pests and plants on their labels, is so extensive, they are not listed in earlier chapters but only referenced here. Whenever you use a pesticide, be sure to read and follow the label.

Appendix B. Sample Design and Layout

PEST PROBLEMS & SOLUTIONS

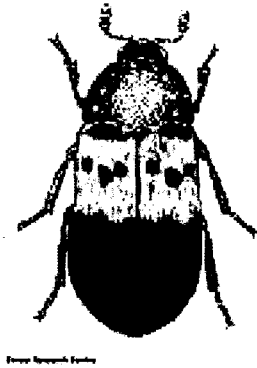


INTEGRATED PEST MANAGEMENT FOR YOUR

Home & Garden

COMMON PESTS INSIDE AND AROUND THE HOME

LARDER BEETLES



LARDER BEETLES, *Dermestes lardarius*

Brown, 3/8 inch, with a broad, pale yellow, black-spotted band across the front of its wing covers. Often found around kitchen cupboards, food storage areas, garbage cans, pet-feeding areas, or in walls. Attracted to foods ranging from stored meats, cheese, tobacco, and dog biscuits to grease, dead insects or rodents, partially burned food, or kitchen wastes.

IPM Answer: Inspect and clean cupboards and under sinks; sweep or vacuum up dead insects; dispose of dead mice. Store food (including pet food) in airtight bags or canisters or in the refrigerator. Clean up and remove food debris and garbage. Clean ovens, stovetops, and the cracks between kitchen counters or cabinets and appliances or floors—any nook or cranny where spills and crumbs accumulate unseen.

How to Clean the Pantry

No need to panic when a moth flutters out of the cupboard or beetles show up in the cake mix. Just take these practical steps:

1. Discard infested products.
2. Find out if it's an isolated incident: If you've just found evidence of insects in or near a recently purchased box or bag of food, you might be lucky. Get rid of it (in an airtight garbage bag) and inspect the area and nearby products. If no more pests appear within the week, you are done. Otherwise, here's what to do:
3. Remove everything from the storage area: Put all food products aside and either throw them out or tightly package those you want to keep. Use heavy-duty zipper-type bags (insects can chew through lightweight kinds), tight canisters, or sealed plastic containers. (An advantage to sealing food products in clear baggies: if and when the pest emerges, you will know what's causing the problem.) Remove all shelf paper, dishes, and paper products.
4. Clean the shelves, walls, cracks and crevices. Vacuum all cracks and corners, since insect eggs or pupae and scraps of food may be hidden there. Remember the upper corners and ceiling. Next, scrub all surfaces with warm water and detergent. Repainting kills many residual pests. If infestations have been severe, do not use shelf paper since it provides extra hiding places. Before repapering or restocking the area, be sure everything is dry.
5. Store food products wisely: If foods can be refrigerated or frozen, or stored in the garage or outdoors (bird seed, some pet foods), do so. Put everything possible into heavy-duty baggies, canisters, or jars with screw lids. Don't keep boxed or bagged foods (mixes, flour, rice) for long periods of time.
6. Clean as you go: When working in the kitchen, don't leave spills behind. This includes traces of food products on the containers or shelves. Close or reseal packages tightly.

Prevention is much easier than battling an infestation!

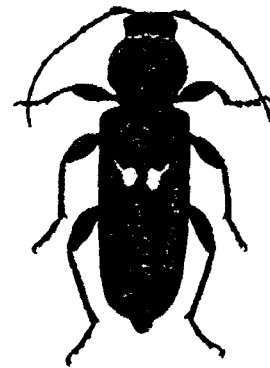
Inspect taxidermy specimens or other items made from animal parts, since your problem may originate there. Get rid of the food source and your problem is solved. No pesticide is recommended.

WOOD-BORING BEETLES

Many kinds of wood-boring beetles infest wood: some in forests, others in homes. Some are partial to only one kind of wood while others feed on many. Some will reinfest wood; others are a one-time thing. Some attack only dead wood, others living wood; some require moisture while others don't. This means you need to know what you've got in order to deal with it. Fortunately, most of these beetles—with the exception of the old house borer, which can quickly become destructive—create tunnels very slowly, so there is usually time to identify and analyze the situation.

OLD HOUSE BORER, *Hylotrupes bajulus*

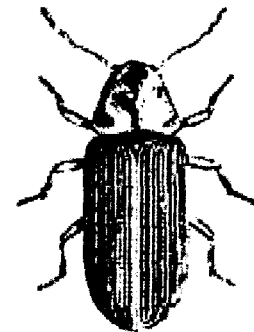
Adults are black to gray-brown; 1/2 to 3/4 inch long. Larvae bore through and feed on seasoned (dry) softwoods (pine, spruce, fir; framing lumber and trim boards); hollow out extensive galleries. Reinfests readily. Important pest of log homes. May also infest furniture made of softwoods. Life cycle may last two to 12 years, depending on temperature and how damp the wood is. During spring or summer you might hear the larvae chewing as they feed. Look for adults, or for the broadly oval-shaped holes (up to 3/8 inch wide) that they emerged from, in June and July.



IPM Answer: Spot-treat limited infestations with borates (disodium octaborate tetrahydrate). Always read and follow the instructions on the label. Seek professional help for extensive infestations; fumigation with insecticidal gas is often necessary.

POWDERPOST BEETLES, *Lyctus sp.*

Many beetles are called powderpost beetles. True powderpost beetles (Lyctidae) are common in houses and furniture. Look for small holes, 1/8 inch across, and very fine powder beneath wood. [illustration] Well-dried and finished wood is rarely susceptible.



IPM Answer: Dry out wood, reduce humidity. Refinishing and avoiding dampness are usually sufficient controls. Borates are labeled as pesticides for powder post beetle control and must be used on raw wood before painting, staining, or varnishing—or you must remove the finish to use them. Always read and follow the instructions on the label.

BED BUGS



BED BUGS, *Cimex lectularius*

Oval-bodied, adults 3/8 inch, brown to red-brown; wingless and flattened. Resemble small dark buttons with legs. Usually feed at night, taking a blood meal from sleepers on exposed skin. Hide near sleeping places during the day. A bed bug that has recently fed is engorged with blood, dull red in color with a swollen hind end. Diagnosing what exactly bit you can be tricky, since bites are minor or even unnoticeable to most people, but others react with a red rash. Does not transmit disease.

Often found in large groups. Go through “gradual metamorphosis”: young resemble adults (but are much smaller). Eggs: small and white with a sticky coating; placed in cracks and crevices of bed frames, floors, and walls. After feeding, adults and nymphs may rest for a few days digesting their meal. Adults can survive long periods, up to a year, without food. Rarely seen in daytime; presence may be indicated by small black or brown spots on sheets—actually marks from bed bug droppings.

Prevent! Bed bugs usually arrive in homes in used bedding or furniture; or in luggage. Much easier to prevent than to eradicate!

If you have returned from a trip to a place where bedbugs are common: Isolate all your luggage, souvenirs, etc—anything you brought back with you in a sealed plastic bag, or keep it out of the living space until you can inspect it thoroughly. Put laundry immediately into a hot water wash; dry on high heat. Remember to include the clothes you wore home. Inspect all baggage: cosmetic cases, travel alarms (look in the battery compartment), laptops—anything with a crack or crevice an enterprising bug could crawl into. Freeze items you can’t wash.

If you bring furniture home—particularly if it is used, loaned, or handed down: Isolate incoming bedding or furnishings for several days. Inspect thoroughly, paying special attention to tucks, cracks and crevices. Bedding can be placed in tightly closed, clear plastic bags; inspect often and where possible, launder or clean before use.

Checking for bed bugs when you’re on the move

Traveling? Pull the headboard away from the bed; untuck the sheets and look at the mattress seams. Examine nearby drawers, appliances, baseboards, and trim. Look behind picture frames and along carpet edges.

Don’t want to bring them home with you? Bed bugs are notorious hitchhikers. Place your luggage up off the floor; check all belongings carefully before you repack.

Want to help out? Report immediately to management. The vast majority of hotels and motels are working very hard to stay on top of bed bug infestations—a daunting problem, given the huge upswing in global travel. They will appreciate your help and sensitivity.

IPM Answer:

1. Inspect: If you suspect bedbugs, inspect the room thoroughly, looking for spots left by bed bug droppings. Start with luggage, recently acquired furniture, or bedding.

Focus on crevices in bed frames, mattresses, box springs; behind buttons or handles; between boards or slats in bed frames. Dismantle the bed and stand all of the components on edge so you can examine lower as well as upper surfaces.

Take everything out of dresser or nightstand drawers; examine each thing carefully (or wash in very hot water; dry on high heat). Tip dresser or nightstand over to examine the woodwork beneath. Look in and behind picture frames; behind light switches; along carpet edges and cracks between baseboards or trim and walls; in toy boxes and closets; behind peeled wallpaper or appliances—TVs, clocks, telephones, radios, etc.

Check the seams, tufts, skirts, and crevices of all furniture that's anywhere near the bed; tip on end to see better.

2. Remove: severely infested bedding or furniture immediately.
3. Wash bedding: Put bed linens, pillows, and stuffed toys in the laundry or seal them tightly in plastic storage bags for several days to watch for signs of insects. Clean infested bedding. Do not treat bedclothes with any chemicals; wash them in hot water with detergent and place in hot dryer for 20 minutes.
4. Vacuum: include all floors, walls, mattresses (especially crevices, seams, tufts), baseboards, cracks in walls, around windows, furniture. Dispose of vacuum contents. Repeat inspections and cleanup frequently if bed bugs persist.
5. Isolate: If you have replaced or cleaned mattresses and bedding but suspect bed bugs elsewhere in the room, move the bed away from the wall and keep bedding from touching the floor; slather the legs of beds with petroleum jelly; this prevents insects from crawling up the legs while you continue your inspection.
6. Pesticide options: Though clean-up is critical; pesticides may help—but knowledge is key. Some sprays simply repel bed bugs, spreading them around. Labeled pesticides include cyfluthrin, deltamethrin, diatomaceous earth, silica gel, permethrin. Apply to hiding places around baseboards, trim, and floorboards. The insect growth regulator, hydroprene, is also listed for bed bug control. Always read and follow the instructions on the label.