New Mexico State University

Facilities and Services

Integrated Pest Management

TABLE OF CONTENTS

Identification Guide for Pests and Beneficial Organisms

Appendices

woywood/Projects/IPM-Manual/toc

PESTICIDE PROGRAM AT NEW MEXICO STATE UNIVERSITY

Introduction

In an effort to comply with occupational safety and health administration (OSHA) Hazard Communication Standards and New Mexico State University (NMSU) Environmental Health and Safety Office Pesticide Policy, members of the NMSU Facilities and Services (FS) Landscape Management and Restoration Department develop this manual to inform faculty, staff and students of the department's intention to meet the following standards.

Minimize interior application of chemicals by strategically managing exterior areas or by applying integrated pest management (IPM) practices.

Indoor chemical spraying must not expose faculty, staff, or students to hazardous vapors. Large area applications should be conducted after hours when buildings are not occupied or personal should leave the area during very limited (spot) applications.

Building occupants have the right to be informed of pesticide use in their work area per the OSHA Hazard Communication Standard.
-Material Safety Data Sheets (MSDS) for each pesticide used are readily available at the Landscape Management and Restoration Department. See section IV for a description of MSDS.
-Schedules for pesticide application also are available through the Landscape Management and Restoration Department, or appointments will be made (usually through the building monitor).
-Employees are informed of application and should leave the affected area during spray applications.

Only food-safe pesticides will be used inside the buildings.

Residues will not be left on working surfaces.

Only licensed applicators will perform treatment.

General Policy Statement

It is the policy of the Landscape Management and Restoration Department to achieve long-term, environmentally sound pest suppression through the use of a wide variety of technological advances and management practices. Pests will be manage in order to reduce any potential human health hazard, to protect against a significant threat to public safety, to prevent loss of or damage to university property, or to enhance the quality of life for students, staff, faculty, and advisors.

This policy statement will provide the FS managers with an effective way to respond to a questioning public and improve the facility's internal decision making process. The policy is founded on the principles of IPM to assure the safest and most reliable pest control possible. It also will provide procedural guidelines for in-house operations or to create specifications for contract pest control. The policy will educate applicators, administrators, and others about when and why pesticides are use and when alternative methods can be used. If concerns arise regarding the control method applied or its efficacy, the policy will help provide the facility manager with guidelines to handle the issue and help document that the Landscape Management and Restoration Department has acted responsibly.

With this manual, staff, students, faculty, and the public will be educated about potential university pest problems and the IPM policies and procedures to be used to achieve the desired pest management objectives. Records of pesticide use, as require by the New Mexico Department of Agriculture, shall be maintained at the Landscape Management and Restoration Department. In addition, pest monitoring data sheets or other indicators of pest populations are to be maintained to verify the need for treatments. Pesticide purchases will be limited to the amount anticipated for use during the year. Pesticide storage and disposal shall occur in an appropriate, secure site not accessible to students or unauthorized personnel. Pesticide applicators must be trained and state-certified in the principles and practices of IPM and must follow label regulations and precautions.

Control techniques in an IPM program extend beyond the application of pesticides to include structural and procedural modifications, which will reduce the food, water, harborage, and access used by pests. IPM procedures will determine when to control pests and whether or not to use physical, cultural, biological, or chemical means. Strategies for managing pests populations will be influenced by the pests species and whether or not that species poses a significant threat to people, property, or the environment. Non-chemical methods will be implemented whenever possible. The choice of using a chemical pesticide will be based on a review of all available options; cost or staffing considerations alone will not be adequate justification for the use of chemical control agents. The full range of alternatives including no action will be considered. When it is determined that a pesticide must be used, the least hazardous material will be chosen for application.

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INTEGRATED PEST MANAGEMENT

Introduction

"Pests" are the animals and plants which disturb our desired environment. Health, welfare, comfort, property, and aesthetics are elements of life upon which humans place value and which can be affected by pests. People must utilize their knowledge of pest anatomy, classification, growth, development, biology, and behavior to adequately control pests.

All species of living organisms have an inherent ability to reproduce. Manipulating the factors which limit the reproductive and survival potential of each pest is the key to effective pest management. In the past, this usually involved the use of pesticides, but pest management professionals are turning to prevention (which includes removing the food, water, and shelter of pests) as a control measure. When these more benign methods are integrated with appropriate chemical control measures, a more lasting control is possible.

Some animals are beneficial and rarely are considered pests. Examples include bees, bats, spiders, and snakes. In general, these animals are not a threat to humans unless they are disturbed.

Definition

Integrated pest management (IPM) is a decision-making process that uses all available pest management strategies to prevent economically damaging pest outbreaks while reducing risks to human health and the environment. IPM programs use current, comprehensive information on the life cycles of pests and their interactions with the environment. IPM is a continuum along which there are many levels of treatment. IPM programs take advantage of all pest management options possible, including but not limited to the judicious use of pesticides. Pest control can range from simple monitoring to properly timed pesticide use or even biointensive IPM, in which there is total elimination of synthetic pesticides, such as in organic farming.

Components of an IPM program

Monitoring – Become familiar with your area of responsibility, so you will know when something out of the ordinary occurs. Monitoring can be incorporated into a cleaning routine or can even be a step as simple as taking a walk around your work site during a break. Indoors, take note of food storage or preparation areas, trash cans, and by water sources (bathrooms, kitchens, and water fountains). Outside, look around garbage dumpsters, the building perimeter, and the general grounds.

Record keeping – Document each time you perform your monitoring route. Make note

Of the time of day, were you monitored, and, if outside, the weather conditions. Be sure to write down if you notice any evidence of a pest (see next item). Knowing where, when, and what pests are seem on campus will help focus pest control efforts and will be helpful to professional pest control operators, Also note, if you know, when a pest control application has been made.

Recognizing- How do you know that a pest is present? The most obvious sign is actually seeing it. Secondary signs are any sort of physical evidence (droppings, chew marks, odor, holes in the walls, etc.)

Rating- Determine the level of concern; consider if treatment is even necessary. The mere presence of a pest doesn't necessarily warrant treatment. Only treat a problem if a pest is present at an unacceptable level.

> Economic injury is the measure of damage to a structure or plant. Once damage has reached a level that exceeds the cost of controlling the pest, control can be considered. An example is a termite infestation.
>
> Aesthetic injury is the capability of a pest to be a nuisance. Aesthetic injury levels are subjective. Sometimes, a fairly large pest population can be tolerated while, at other times, the presence of a single pest is among individuals. An example is a nest of cooing pigeons outside a classroom window.
>
> Medical injury is considered present if a pest can cause human illness, either directly or indirectly. An example of this is Hantavirus, a rodent-transmitted disease.

Identifying- Positive and accurate identification is needed to make a thorough examination of the problem and an appropriate method of control. When pests cannot be located, identification must be made from damage, tracks, droppings, or cast skins. Different pest biologies and behaviors necessitate different control methods, so identification must be accurate to ensure successful control.

Preparing- Recommendations for eliminating the pest problem should be made only after a site inspections has been completed and all the facts surrounding the problem are known. Because biological systems are so complex, treatment must integrate several strategies. Rarely will a single tactic solve the problem for an extended period. Implementing and IPM program means approaching the task with a "whole system" process which involves living and non-living components. Humans, the pest, the site, and the treatment are part of an ecosystem; each component impacts every other component. Consider the following questions.

> What type of control method is most appropriate? – Pests seek habitats that provide basic needs such as air, moisture, food, and shelter. Pest

populations can be prevents or controlled by creating inhospitable environments, by removing some of the basic elements which pests need to survive, or by blocking their access into buildings. For examples, see “Control Methods” in section III.

- Cultural control utilizes proper sanitation and maintenance techniques to prevent pest establishment.
- Mechanical control’s goal is pest exclusion through physical barriers or activities.
- Biological control uses beneficial organisms that prey on pests.
- Chemical control will be selected only if all other suitable control strategies are not fully effective or practical.

Where should the treatment take place? – Determine the location where a treatment will have the greatest effect.

When should the treatment occur? - Timing of the treatment is important. There are optimal times in a pest’s life cycle when it is most susceptible to a control method. Treating at the wrong stage in a pest’s life most likely will be ineffective.

Is the treatment appropriate? – Ensure that treatment method will be appropriate for the pest and the environment. Try to use the most effective method that carries the lowest level of risk. Control options should account for the following criteria before being implemented.

- The treatment is the least hazardous to human health and least toxic to non-target organisms.
- The method is the least damaging to the general environment.
- The section is likely to produce the most permanent and most effective reduction of the pest.
- The treatment is the easiest to apply effectively.
- The material chosen is the least disruptive of natural controls.
- The method is cost-effective in both the short and long terms.

Treating – Use all methods, especially pesticides, with care. Follow the application instructions exactly.

If using pesticides, apply them so that direct contact, inhalation of vapors, and access to the treated area by others are minimized. One objective of chemical control should be to minimize the use of liquid pesticide applications wherever possible. Bait formulations, rather than sprays, may be used in some instances, Baits are more target-specific than traditional contrail techniques and, in many cases have proven to be more cost-effective over the long term. A limited amount of active ingredient is applied in the form of baits and in a limited are; there is little odor and no drift.

The treatment program should include not only what the pest control professional does for the client but also what the customer should do in the way of harborage

elimination, building repairs, sanitation, etc., to make the control program more successful and longer lasting. At this point, any limitations of the particular job should be explained to the customer.

Follow-up the treatment – Evaluate the treatment's efficacy. Resume monitoring as before. Apply the control professional's recommendations of cultural controls, such as sanitation, to prevent new pest problems from becoming established.

Hiring a professional pest control technician

Professional operators are expected to adopt the most current IPM practices that maximize effectiveness and safety and minimize environmental impact. They must stay informed of current best practices and are encouraged to consult with entomology experts to regularly review and evaluate alternative pest control methods.

Pesticide applicators are to minimize risks by using the lowest risk pesticide capable of correcting a pest problem. They are responsible for proper disposal of their rinsate, surplus, and waste.

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PEST CONTROL PROCEDURES

Service routine for technicians – The pest control technician should properly prepare him/herself to perform work in a professional manner. It is important to set up a regular routine to provide better service.

Before Leaving the Shop

_____ Check all equipment and materials for proper operation and cleanliness.
_____ Load all necessary equipment and materials onto the service vehicle.
_____ Check your personal appearance: shoes shined, hair combed, facial hair groomed (if applicable), uniform clean, and shirt tucked in.

Upon Arrival at the Job Site

_____ Park in an appropriate parking space.
_____ Lock the vehicle.
_____ Take all necessary supplies with you.
- Flashlight.
- Magnifying glass or hand lens.
- Screwdrivers (Phillips and flat-head).
- Pliers.
- Adjustable wrench.
- Flushing agents.
- Glue boards or sticky traps for monitoring pest presence.
- Mechanic's mirror.
- Collecting vial.

Entering the Customer's Premises

_____ Always enter by the front door.
_____ Set equipment in an inconspicuous place where it will not interfere with the business operation and where no one can fall over it.
_____ Meet the building monitor or person who submitted the work order.
_____ Confirm with the customer what service will take place.

Inspecting the Site – Inspection is essential to solving pest problems quickly and economically. Visit the premises with the client, and verify the customer's concern and request for treatment. Modify your service to accommodate the particular needs of the customer.

A one-time inspection by the pest control professional after a pest has been reported might not reveal enough information. With the contact person, inspect the area in which pests will be controlled. Ask questions of the customer while examining the premises, to learn as much as possible about the problem.

During the inspection, the professional should look for potential harborage areas;

conditions of moisture, heat, or darkness which favor infestations; food and water that can be utilized by the pests; probable means of entry; and evidence of infestation. Pest control technicians should look for any areas, equipment, structural features, or area management practices that contribute to pest infestations. Such "hot spots" include the following.

- Areas where food or beverages are consumed or stored, such as kitchens, break rooms, or vending machines.
- Inside computer equipment (which offers warm harborage to pests).
- Above suspended ceilings or below raised floors.
- Any hidden voids or passageways that may have been created during facility renovations.

The inspection will also give the professional some idea of the measures that may be necessary and when the work can best be done. Thoroughness during the inspection is of great importance in providing many of these answers. Inspection will provide information helpful in deciding which techniques should be used and where treatments must be directed. The type, quantity, and location of treatment depends on the information provided by monitoring and inspection.

____ Accompany the contact person on a tour of the area in which pests were observed. Look in areas surrounding the primary infestation site, as well.

____ Ask questions of the contact person.

- The kind of pest (and if specimens have been saved by the customer).
- Number of pests.
- Pest location.
- Damage that might have occurred.
- Length of time which pests have been present.
- Evidence of infestation.
- The customer's threshold of tolerance (although, since treatment has already been requested, the threshold apparently has been exceeded).

____ Use one of the attached forms (Appendix H) to ensure you have considered all factors.

<u>Diagnosing the Problem & Selecting Treatment</u>

____ Determine what pests are there, according to the questions and evidence.

____ Identify all possible control measures, no matter how difficult or expensive.

____ Using the attached guide, select the most effective and safe control method.

____ Modify your proposed treatment to the particular needs of the customer.

<u>Prior to Treatment</u>

____ Set the time and date with the contact person for the area to be serviced. Large area, interior applications should be scheduled for when the building is not occupied. Exterior applications shall be made when it is deemed most convenient for pedestrians.

____ Give written notice to area occupants. Adapt the attached form (Appendix I) for use at your facility.

____ Leave a copy of the product label and MSDS with the contact person.

Applying Treatment

____ Inside – If a spot application of pesticide is necessary, the occupants should leave their work spaces while the chemical is being applied.
____ Outside – If the treatment included application of a pesticide with a restricted re-entry period, the area should be blocked to prohibit access for the duration designated by the product label.
____ If multiple chemical types are required, follow this order of application: sprays, dusts, baits.

Completing Service

____ Signs notifying area occupants and visitors about the treatment should be posted immediately after treatment has been completed.
____ Replace any of the customer's materials that you moved.
____ Clean any treatment residues off of client work surfaces, and remove any evidence of pests. Always leave the customer's area clean.
____ Replace supplies in vehicle.
____ Wash hands.
____ Fill out required paperwork. Ensure that you print clearly and legibly.
____ Confirm with the client that service has been completed.
____ Leave site in a professional manner.

Following Service

____ Phone customer to see if pest has returned.
____ If pest is still present, determine why treatment did not work.
- Did the pest avoid the treatment?
- Was an incorrect treatment method chosen?
- Did environmental factors reduce the effectiveness of the treatment?
- Was the treatment applied incorrectly?

____ Repeat service, if necessary.

CONTROL METHODS

Cultural Control

Indoor

Explain to the client and coworkers the importance of sanitation in pest prevention.

Request the building monitor to prohibit any food storage or consumption within the facility, or at least to limit it to certain areas.

Remove clutter and dispose of trash that can harbor pests.

Allow houseplants to dry slightly between waterings to discourage fungus gnats.

Do not purchase any plants obviously infested with fungus gnats.

Keep any food products in sealed containers.

Do not store food or garbage inside for longer than necessary.

Rinse drink or food containers thoroughly before disposal.

Regularly dust and vacuum.

Outdoor

Insects

Empty trash cans regularly, especially if they hold disposed drink containers or food. Stinging insects such as yellow jackets may be inside, gathering food to take back to the hive. To deter insects from feeding, make sure each trash container has a snug-fitting lid.

Prevent temporary areas of standing water. Puddles are breeding grounds for mosquitoes, a water source for many insect species, and a mud source for mud daubers.

Remove debris and trash piles. Africanized bees find such areas well suited to build their nests. Discarded tires and other items can hold water and provide mosquito breeding areas.

Keep grass and weeds short, to reduce food and cover for grasshoppers.

Maintain the preferred irrigation and fertilization schedule of each plant species. Plants which receive too little or too much fertilizer or which are over- or under-irrigated are stressed and more susceptible to insect attack.

Weeds

Mowing will prevent taller weed species from going to seed. However, it will not deter ground-hugging weeds like dandelions or clover.

A three to four inch thick layer of mulch will repress weeds. Seeds that germinate below the mulch will have difficulty reaching through to the light. Seeds that fall on top might germinate but not be able to root into the soil. A porous, woven fabric barrier will deter weeds, require a thinner layer of mulch to cover it, and still allow water and air to reach the root zone of your desired plants (which a sheet of plastic will not do). Note: as wind-blown dirt accumulates on top of a mulch layer, the weed-suppressing effect can be diminished.

Ground covers can be called a "living mulch". When plants like Junipers or Periwinkle cover the ground, they discourage establishment of many weed seeds or Bermudagrass stolons. They also are considered by some people to be more aesthetically pleasing than stone mulch.

Fertility

· Applying more fertilizer than needed by your turf or ornamental plants will leave ample nutrients for weeds, too. Conversely, inadequate fertilization will inhibit growth of your desired species and make it easier for weeds to take over.

· Similarly, only put out fertilizer when plants need it. Bermudagrass and deciduous trees and shrubs go dormant in the winter, so they won't absorb any fertilizer applied in that season. Cool season weeds, consequently, will take advantage of the extra nutrition. A similar warning applies for warm season weeds and cold-preferring ornamentals (like Pansies or Tall Fescue turf) in the summer.

The pH of New Mexico's soil is difficult to change significantly. Keep this in mind when selecting ornamental species for your property. Plants which are not tolerant of a high pH will be weaker and more likely to be overcome by weeds.

Aeration of turf also can contribute to weed suppression. Some weeds grow better in compacted soils than some turf species.

Change the irrigation method of a shrub bed, if necessary. Drip irrigation will limit water to the area immediately around the emitters, so weeds won't get the water they need to grow, as is possible with spray irrigation. Inhibit weed growth further by adjusting sprinkler heads from adjacent turf areas to reduce overspray of water onto shrub beds.

Mammals

Remove as many readily available food sources as possible; well-fed pests are more likely to reproduce. Empty the trash frequently, especially if it contains food. Use tight fitting lids on trash cans, and close the covers of dumpsters.

Remove potential habitat, so animals will find it more difficult to locate shelter.

- Seal openings to buildings and remove debris/junk piles
- Ground squirrels prefer open areas, so let grass grow long wherever possible.

Birds

As with other types of pests described above, reducing access to potential food sources will inhibit reproduction of a pest bird.

Swallows can be discouraged from nesting in certain areas by knocking down their nests with a broom or stream of water. According to the federal Migratory Bird Treaty Act (Appendix F), swallows are a protected species, so nest destruction can only occur from September to February and requires a permit to be performed on public land. Once nesting season begins, all nest destruction must stop.

Diseases

Irrigation

- Scheduling irrigation with a programmable, automatic timer helps avert disease, especially with spray application, as is commonly used for turf. Irrigating between 3:00 and 7:00 a.m. reduces evaporation yet does not allow the grass (or other plants) to be wet most of the night, which would encourage diseases to establish.
- Spray irrigation is currently the most effective way to irrigate turf. However, other plant types are better suited to drip irrigation, which does not cause the leaves to become wet and play host to various pathogens.

Mowing (turf)

Healthy plants resist disease, so fertilize them regularly.

Pruning trees to promote air flow through the canopy (a method commonly practiced in apple orchards) can inhibit pathogen growth in some species. Situating ornamental specimens farther apart in mass plantings can increase air flow, as well.

Poor drainage weakens most plants, which in turn makes them more susceptible to diseases. Also, standing water will raise the humidity and create a moist surface amenable to common pathogens.

Resistant species – Some cultivars have been developed that are more resistant to diseases than the normal species. This is common for Crabapples and Tomatoes and is in development for American Elms.

Avoid monocultures (planting just one species or cultivar in an area). If a pest establishes itself in one specimen, it could quickly spread to the remainder of the planting.

Sanitation

· Keeping an area free of plant debris is a way to prevent many types of diseases. Fallen leaves, branches, and fruits are a source of inoculum for pests that can infect growing plants.

· Clean equipment after working in an area and before moving to the next location.

· Avoid working when it is wet, an ideal time to transmit inoculum.

Follow proper pruning procedures. A tree is better able to heal itself after a proper cut. Improper pruning cuts and wounds offer more opportunity for pathogens to penetrate a plant's defenses.

Plants situated in full sun are less likely to develop fungal infections than those in the shade. If a particular plant species can not tolerate full sun, place it on the east side of a building to inhibit fungal development (by drying out the leaves early in the morning) and provide shade later in the day, when the sun is more intense.

Arachnids

Remove trash and debris. Spiders and scorpions can hide in or under such items.

Mow lawns regularly, to reduce possible cover for scorpions.

Keep trash cans off of the ground, so scorpions can not hide underneath them.

Other Animals

Snakes prefer the cool, moist environment in brush or rock piles, so don't leave any debris outside.

Always keep grass mowed and shrubs pruned away from buildings, so snakes have less cover.

Reduce the rodent population, and the snakes will go away.

Irrigate infrequently and deeply to reduce the amount of moisture preferred by snails.

Mechanical Control

Indoor

Remove webs to force spiders to relocate.

Set out glue boards (or "roach motels") to trap crawling insects or rodents.

Screen all windows and doors to bar insects.

Outdoor

Insects

Knock down hives of wasps, hornets, or bees early in the morning (before sunrise) or late in the evening (after dark). The insects will be least active at these times of the day.

Pour three gallons of boiling water on top of a fire ant mound. If this doesn't kill the queen, try again after the mound entrance has been reestablished. (Digging into the mound before you pour might get you closer to the queen, but this step is not recommended because you are liable to be severely stung before accomplishing anything.) Knocking down the aboveground portion of a fire ant mound is ineffective. The ants simply will rebuild their colony entrance a short distance away.

A technique used for infestations indoors and outdoors is to place sticky, yellow cards to attract aphids, whiteflies, and other insects. The pests are attracted to the yellow color, get stuck on the cards, and can not fly away to reproduce or attack plants. When the cards lose their adhesive property, they should be replaced.

Prune off the part of a branch infested with fall webworm. If the branch is a vital part of the tree or would look unsightly if removed, tear open the webbing to provide access for predators and parasites (*Psychophagus omnivorus*) of the larvae, or spray the webbing with a hose.

Using a water hose, spray the spittlebugs off of plants. This is an effective, inexpensive, and safe control method.

Weeds

String trimmers (weedwhackers) are a quick way to remove the top growth of weeds. However, this method will not kill the roots, and they are likely to regrow, especially perennial weeds.

Hoeing and hand pulling can remove most or all of a weed. Be sure to get as much of the roots as possible; dandelions can resprout from broken roots left in the soil.

Remove branches infested with mistletoe. The sooner this parasite is noticed, the

more likely it can be controlled.

Mammals

Traps can keep animals alive for release elsewhere or kill them for disposal. All skunks, cats, and squirrels shall be trapped alive and turned over to an animal control agent.

Barriers to deter mammal pests include screening, fencing, or covering potential habitat, feeding areas, or pathways.

Flood or destroy burrows to force ground squirrels to relocate.

Use a fine-mesh, metal screen to keep squirrels out of areas where they don't belong. Chain link fencing is not adequate protection.

Birds

Barriers such as metal spikes, netting, or fishing line placed in roosting sites are known to discourage birds. These methods are not 100% effective, especially if they are not maintained.

Noise disturbs birds, but it disturbs humans, as well. There also may be guidelines or laws (such as disturbing the peace) that regulate the application of this method.

Tanglefoot is a way of trapping birds so they can not nest.

"Catch and release" traps are not successful because birds are likely to fly back to the area once they are released elsewhere.

Flashing lights and streams of water might be effective repellents if they are applied at the start of the evening roosting period and continued until after sundown. Over several days, the birds will be discouraged from roosting there.

Plastic predator decoys, such as owls and hawks, will frighten birds from an area. Move the decoys every few days, so the birds will not get used to them remaining in one spot.

Diseases – Spraying the canopy of a plant with water might be an appropriate treatment, depending on the pathogen. Water will wash powdery mildew off of leaves, but it will leave behind water that might encourage germination of other fungal spores.

Arachnids

Using a water hose, spray the spider mite webbing off of plants. This is an effective, inexpensive, and safe control method.

Seal or screen cracks or openings to buildings, crawl spaces, and storage units, so spiders and scorpions can not gain entrance to these favorable, protected sites.

Other Animals

Seal off small holes which snakes can use to enter buildings for protection.

Pick off snails by hand and kill them.

Diatomaceous earth will abrade slugs and snails and cause them to dry up.

Biological Control
Indoor

Outdoor
Insects

Baits (*Entomophthora grylli, Nosema locustae*)are available for grasshopper control.

Microbes can spread throughout aphid colonies once they are introduced.

Predatory insects can be purchased and introduced to feed on various pests. Some Mesilla Valley pecan growers already use this method to control aphids, so beneficial insects from their orchards probably have migrated to campus.

· A tachinid fly (*Erynniopsis antennata*) and a wasp (*Tetrastichus* spp.) prey on Elm leaf beetles.

· The parasitic wasp *Aprostocetus hagenowii* prevents American cockroach egg cases from hatching.

Predatory nematodes (*Steinernema* spp., *Heterorhabditis* spp.)are available for white grub control and should be applied five to six weeks after the greatest June beetle population is observed.

Thelohania solenopsae is a slow-acting pathogen of red imported fire ants. A colony might take 9-18 months to die out after the initial infection. (Predatory insect control of red imported fire ant is currently being studied.)

Arachnids – Some predatory insects, such as the following species, will feed on spider mites: spider mite destroyer (*Stethorus* spp., a genus of ladybird beetle), minute pirate bug, big-eyed bug (*Geocoris* spp.), predatory thrips, and predatory mites (*Galendromus occidentalis, Phytoseiulus persimilis, Mesoseiulus longipes, Neoseiulus californicus*)

Other Animals – Use a turtle or predatory snails to eat snails

Weeds

Purslane sawfly feeds on Purslane.

Puncture Vine is eaten by the Puncture Vine seed weevil and the Puncture Vine stem weevil.

Both the Bindweed gall moth and Bindweed moth feed on Field Bindweed.

Chemical controls

Indoor

To protect sensitive equipment in computer facilities, the use of baits and traps is preferred over sprays and dusts. If sprays or dusts are used, do not apply them directly on or into computer equipment. Droplets or particles can damage sensitive circuitry. Liquid residual applications can be applied more safely by painting material onto surfaces with a brush.

Boric acid is a common, effective treatment for cockroach control, especially if mixed with a bait.

Outdoor

Insects

A mixture of dish soap and water sprayed on bees, wasps, or hornets will coat them and make it difficult for them to breathe. As they fall to the ground, they can be crushed. Note: this mixture can not penetrate hives/nests.

Horticultural oils and soaps are useful for treating sap-feeding insects like aphids and whiteflies without using insecticides.

Systemic insecticides are applied to the plant foliage or the soil, absorbed by the plant, and ingested by insects when they feed.

Foliar sprays will be more effective on isolated cases of aphids or whiteflies. Treating one location that is part of a widespread infestation will kill the treated insects, but more pests will come in from the surrounding area and reinfest the plant.

Baits and dusts broadcast around a red imported fire ant mound will be carried into the mound to feed the queen and developing larvae.

Weeds – Many chemical herbicides are available for use. Be sure to select one that is appropriate for the type of weed you encounter.

Mammals – Chemical controls, such as poisons, repellents, and fumigants are hazardous, so they should be applied only by a certified pesticide applicator.

Birds – Chemical controls, such as repellents and poisons are available but should be used only as a last resort.

Diseases

There are no chemicals available for virus control, but controlling insects which transmit viruses can reduce or eliminate the chance of infection.

Numerous chemicals exist for fungus and bacterium control.

Arachnids

If a water spray does not eliminate the spider mites, try using horticultural oil sprays.

If choosing a chemical pesticide for mite control, be sure to select a miticide or acaricide; insecticides will not be effective because mites are arachnids, not insects. (Note: a miticide or acaricide will also kill beneficial, predatory mites that might be present.)

Chemicals do not kill mite eggs, so a reapplication probably will be necessary to control mites that hatch after the original treatment.

Other Animals – A saucer buried in the ground and filled with beer is a common trap. Snails and slugs will be drawn to the fermented liquid, fall in, and drown.

PESTICIDES AND THE LAW

Introduction

Applying pesticides safely and effectively in public areas requires substantial expertise and skill. Knowledge of the characteristics and potential hazards of pesticides is critical. Federal law specifies that pesticide labels are legal documents. Worker protection is safeguarded by the Occupational Safety and Health Administration (OSHA). Even the Americans with Disabilities Act (ADA) impacts pesticide application by requiring reasonable accommodation for anyone in the vicinity requiring treatment.

The application of pesticides in any area inside or outside the premises should not occur unless visual inspections or monitoring devices indicate the presence of pests in the specific area. Preventive pesticide treatments of an area, where inspections indicate a potential insect or rodent infestation, are acceptable only on a case-by-case basis.

The first management decision in any pest elimination effort should be altering, eliminating, or correcting any conditions which are primary factors in the pest infestation. This will reduce the quantity of treatment needed to eliminate the current pest problem. Failure to address these contributing factors will require that more treatment be applied.

When it is determined that a chemical pesticide must be used, the active ingredient, formulation, and application techniques must be seriously considered. The least hazardous material, most precise application technique, and smallest quantity of pesticide should be used to achieve control.

Understanding pesticide labels

Pest management professionals must carefully study and understand the label on each product before using it. At the same time, all pest management applicators should demonstrate complete familiarity with all labels of these products and strictly adhere to all the directions and precautions listed on each label.

The statement "ALWAYS READ AND FOLLOW ALL LABEL DIRECTIONS" is perhaps the most important overall statement in the pest control industry. It can never be stressed too much or too often. These words should always serve as the professional's general guide for everyday applications of any type of pesticide.

Figures 1 and 2 (Appendix K) show the format and information required by EPA on general-use and restricted-use pesticides. The labels are keyed as follows.

1. Product name
2. Company name and address
3. Net contents
4. EPA pesticide registration number

5. EPA formulator manufacturer establishment number
6a. Ingredients statement
6b. Pounds/gallon statement (for liquid formulations)
7. Front-panel precautionary statements
7a. Child hazard warning ("Keep out of Reach of Children")
7b. Signal word: "DANGER", "WARNING", or "CAUTION"
7c. Skull and crossbones and word "Poison" in red
7d. Statement of practical treatment
7e. Referral statement
8. Side or back panel precautionary statements
8a. Hazards to humans and domestic animals
8b. Environmental hazards
8c. Physical or chemical hazards
9a. "Restricted Use Pesticide" block
9b. Statement of pesticide classification
9c. Misuse statement
10a. Re-entry statement
10b. Category of applicator
10c. "Storage and Disposal" block
10d. Directions for use

Product name

Applicators should not choose a pesticide by product name alone. Most manufacturers of technical pesticides have a product name for each chemical (*e.g.* "Dursban" for "chlorpyrifos") and for each formulation. Different formulators may use different product names for the same active ingredient. Many companies use one product name with very slight variations to designate different formulations.

Ingredient statement

Each label must list what is in the product. This list is written so that the user can quickly see each active ingredient and its amount in percentage by weight. The ingredient statement must list the official chemical names and/or the accepted common chemical names for the active ingredients. Inert ingredients need not be named, but the label must show what percent of the total weight are inert ingredients.

Types of pesticides

The type of pesticide is usually listed on the front panel of the pesticide label. This short statement usually indicates in general terms the pests to be controlled and the product formulation. Some examples follow.

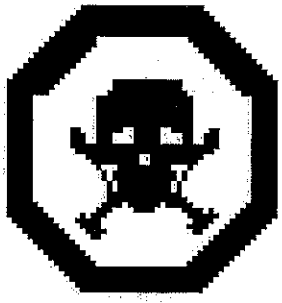
"Insecticide for control of cockroaches, ants, silverfish, etc."
"Fungicide for the control of turf diseases"
"Herbicide for the control of unwanted trees, brush, and weeds"
"Rodenticide for the control of rodents in and around urban structures"

Contents

The front panel of the label tells you how much product is in the container. This can be expressed as pounds or ounces for dry formulations or as gallons, quarts, pints, or ounces for liquids (or their metric equivalents). Liquid formulations may also list the pounds of active ingredient per gallon of product.

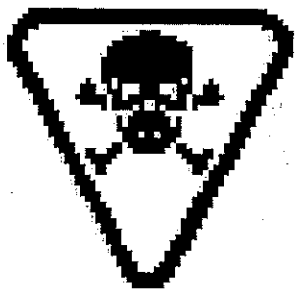
Signal words and symbols

Every label includes a signal word which indicates how potentially dangerous the product is to humans and other non-target animals. Knowing the product's general level of toxicity helps you choose the proper precautionary measures for handling and applying the pesticide. The signal word must appear in large letters on the front panel of the label. It immediately follows the statement, "Keep out of Reach of Children", which also must appear on all pesticide labels. There are three signal words: "Danger", "Warning", and "Caution".



The word "DANGER" signals that the pesticide is highly toxic. A taste to a teaspoonful of the undiluted product taken orally could kill an average size adult. Any product which is highly toxic orally, dermally, or through inhalation or which causes severe eye and skin burning will be labeled "DANGER". If the label carries the "DANGER" signal word, it will also carry the word "Poison" printed in red and the symbol of a skull and crossbones. Many restricted-use pesticides carry these signal words and symbols.

The word "WARNING" signals that the product is moderately toxic. As little as a teaspoonful to a tablespoonful of the undiluted product taken orally could kill an average size adult. Any product which is moderately toxic orally, dermally, or through inhalation or which causes moderate eye and skin irritation will be labeled "WARNING".



The word "CAUTION" signals that the product is slightly toxic. An ounce to more than a pint of the undiluted product taken orally could kill an average size adult. Any product which is slightly toxic orally, dermally, or through inhalation or which causes slight eye and skin irritation will be labeled "CAUTION".

Precautionary statements

All pesticide labels contain precautionary statements which delineate the protection precautions for the applicators, assistants, other people, or animals who may be exposed. Sometimes, these statements are listed under the heading "Hazardous to Humans and Domestic Animals".

Statement of Practical Treatment

All DANGER labels and some WARNING and CAUTION labels contain a section for physicians describing the appropriate medical procedures for poisoning emergencies. They may also identify an antidote. The following statements are typical first aid treatments recommended in case of poisoning.

"In case of contact with skin, wash immediately with plenty of soap and water."

"In case of contact with eyes, flush with water for 15 minutes and get medical attention."

"In case of inhalation exposure, move from the contaminated area and give artificial respiration, if necessary."

"If swallowed, drink large quantities of milk, egg white, or water. Do not induce vomiting."

"If swallowed, induce vomiting."

Physical or chemical hazards

This section of the label notes any special potential hazards such as fire, explosion, or chemical that the product may pose. Examples follow.

"Flammable: do not use, pour, spill, or store near heat or open flame. Do not cut or weld container."

"Corrosive: store only in a corrosion-resistant tank."

Environmental hazard

Pesticides might be harmful to the environment. Some products are classified as "restricted use" because of the potential environmental hazards they pose. Watch for special warning statements on the label concerning hazards to the environment.

Classification statement

Every pesticide is classified by the EPA for either *general* or *restricted* use. When a pesticide is classified for general use, the words "general classification" will appear immediately below the heading "Directions for Use". Every pesticide product which is classified as "restricted use" must carry the following statement in a prominent place (usually in a word block or box) at the top of the front panel of the label. "RESTRICTED USE PESTICIDE: For retail sale to and to be used only by certified applicators or persons under their direct supervision and only for those uses covered by the certified applicator's certification."

Re-entry statement

Some pesticide labels with the signal words "DANGER" or "WARNING" include a re-entry precaution. This is especially true for cholinesterase-inhibiting insecticides like organophosphates and carbamates. This statement states how much time must pass before people can re-enter a treated area without appropriate protective clothing. It is illegal to ignore re-entry intervals. Typically, these statements are found on formulations used in total-release aerosols, foggers, ULV machines, or fumigants.

Storage and disposal

All pesticide labels include general instructions for the appropriate storage and disposal of the pesticide and its container. State and local laws vary considerably, so specific instructions usually are not included. One or more of these statements may appear on a pesticide label. Use them to determine the best storage and disposal procedures for the operation and location. These statements may appear in a special section of the label titled "Storage and Disposal" or under headings such as "Important", "Note", or "General Instructions". Typical statements include the following.

"Not for use or storage in and around the home."
"Store at temperatures above 32 °F (0 °C)."
"Do not re-use container."
"Triple-rinse and offer this container for recycling or reconditioning or send to an approved landfill."
"Do not re-use bag. Burn or send to an approved landfill."

Directions for use

The instructions for proper pesticide use are a very important part of the label to read and study. These directions are the best way to find out the proper and safe way to apply the product. The use directions tell the following information: the pests which the manufacturer claims the product will control; the crop, animal, or site the product is intended to protect; how much to use; mixing directions; compatibility with other often-used products; phytotoxicity and other possible injury or staining problems; where the material should be applied; when the material should be applied.

Material safety data sheets (MSDS)

An MSDS for each chemical is located in the grounds shop. MSDS and labels for many pesticides are available online at the following site: http://www.bluebooktor.com/. The following information is described on a pesticide MSDS: manufacturer's identity; chemical identity; physical and chemical characteristics; fire and explosion hazard data; health hazard data; reactivity data; precautions for safe handling and use; control measures; date the MSDS was prepared or revised. A sample MSDS in included as Appendix M.

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SAFETY PROCEDURES

Compliance with federal and state laws

All New Mexico State University employees and contractors shall comply with federal and state laws that apply to pesticide use. These laws require the following.

- Pesticides are stored, handled, and disposed of in accordance with label directions.
- If required by the State of New Mexico, pesticide users shall be certified through a Pesticide Applicator's Certification Program.
- Under certain circumstances, employees who apply pesticides may be trained or supervised by a certified applicator.

Preventing pesticide exposures

Following are proposed guidelines for reducing levels of pesticide exposure and minimizing potential hazards.

- Select the safest formulation, usually granular or microencapsulated materials.
- Use a pesticide with a reduced concentration of active ingredient.
- Reduce the rate of application to the lowest effective level.
- Mix only enough pesticide to complete the assigned task.
- Select a method of application that minimizes personal contact.
- Purchase only enough pesticide to do the job.
- Wear all protective clothing stipulated on the label.
- Avoid direct contact with the pesticide when mixing and filling equipment.
- Use pesticides only in well-ventilated areas.
- Consider the safety of others around you during application.
- Dispose of pesticide containers properly.
- Be attentive to re-entry intervals specified on the label.
- Always keep pesticides in their original, labeled containers.
- Avoid pesticide drift.
- Avoid conditions which might lead to groundwater contamination.

Personal safety

Preventing exposure to pesticides requires personal protective equipment (PPE) as shown in Appendix J. The types of PPE required vary according to the toxicity of the pesticide. Read the pesticide label for complete instructions and specific requirements related to PPE. Pesticide exposures can be minimized by following all safety precautions found on the pesticide label. Remember, the primary line of defense against exposure to pesticides is personal protective equipment.

Mixing pesticides normally requires more personal safety equipment than applying them (except fumigating). This is because the mixing process necessitates handling

pesticides in their most concentrated forms.

Eye protection – When required by a product label, safety glasses or goggles must be worn. Prescription glasses, sunglasses, or contact lenses are not sufficient protection from chemical spray or drift.

Ear protection – The use of earplugs or earmuffs is optional, unless required by a product label.

Lung protection – Dust masks and respirators will be provided to chemical applicators. Appropriate PPE must be worn when required by a product label. Voluntary use of PPE (*i.e.* not mandated by a label) is allowed.

Protective clothing – Appropriate clothing should be worn at all times. Refer to the product label for the required degree of protection.

Labeling systems

Appendix J lists the PPE combinations applicable to statements on pesticide labels.

The Hazardous Material Identification Guide (HMIG) and Hazardous Material Information System (HMIS) are two formats sometimes used to designate in a visual form the PPE required. If a pesticide label contains a letter (A-K or X) indicating the level of PPE, refer to the chart below to determine what protective clothing is required for that application.

Symbol	Personal Protective Equipment (PPE) Required
A	Safety Glasses 
B	Safety Glasses Gloves 
C	Safety Glasses Gloves Apron 
D	Gloves Apron Face Shield 
E	Safety Glasses Gloves Dust mask 

F	Safety Glasses Gloves Apron Dust mask 
G	Safety Glasses Gloves Vapor Respirator 
H	Safety Glasses Gloves Apron Vapor Respirator Goggles 
I	Safety Glasses Gloves Vapor Respirator 
J	Gloves Apron Vapor Respirator Goggles 
K	Gloves Air Line Hood or Mask Full Suit Boots 
X	Ask supervisor or safety specialist for handling instructions.
Source material adapted from: "Safety in the Chemistry Laboratory" (University of Oregon) and Lab Safety Supply.	

Handling pesticide-contaminated clothing – Always assume that clothing, aprons, and gloves worn while working with pesticides have been contaminated and should be laundered after each use. The longer the pesticide-contaminated clothing remains unwashed, the more difficult the process of pesticide removal. It is best to soak contaminated clothing in hot water containing a heavy-duty liquid detergent before washing. Start the wash cycle after the pre-soaking water has been drained. Pre-soaking followed by regular washing is the most effective method of removing low-level pesticide contamination from clothing, aprons, and gloves. Care must be exercised when handling pesticide contaminated clothing. If there is any doubt that contaminated clothing can be laundered effectively, discard it. For example, absorbent clothing contaminated with liquid concentrates should be discarded. Non-absorbent items (certain types of chemical resistant gloves, boots, and aprons) may be re-used.

Issuing PPE – Each applicator will be provided his/her own PPE that will not be shared with another person. PPE must be tested for proper and safe fit, as required by law, before it is used. Damaged PPE should be replaced as needed.

Replacing PPE – Single-use items should be disposed of in a safe, legal manner. Reusable PPE should be cleaned and stored appropriately after each use. Damaged items or those that become improperly fitting will be replaced. Replacement parts (respirator filters, etc.) will be issued according to the manufacturer's guidelines or according to law.

Pesticide Safety Tips

Always read the label before buying and/or using pesticides. Use pesticides only for the purpose(s) listed and in the manner directed

Pesticides that require special protective clothing or equipment should be used only by trained and experienced applicators

Do not apply more than the specified amount of pesticide. It is illegal to apply more than labeled rates. Over-application is wasteful and can harm people and the environment

Keep children and pets away from pesticides and areas where pesticides have been applied for the time limits on the label

Keep pesticides away from food, dishes, and utensils

Do not smoke or eat while applying pesticides; avoid inhaling pesticides

Never spray pesticides outdoors on a windy day

When mixing pesticides, be careful to avoid splashing

Avoid damage to or spills from pesticide containers

If you spill a pesticide on your skin, wash immediately with soap and water. If you contaminate your clothing with a pesticide, change immediately and launder it according to instructions given above.

Wash with soap and water after using pesticides, and launder clothes before wearing them again.

If someone swallows a pesticide, call a physician, hospital, or local poison control center immediately. Keep the pesticide label or labeled container with you as a reference for the physician

Store pesticides in a locked area in their original containers with proper labels. Never transfer a pesticide to another container.

Dispose of empty containers properly, as described on the label

Keep a pesticide use and application record.

Environmental safety

Apply treatments in a manner that prevents contamination of non-target areas. For example, do not spray on windy days.

Decide with Care – The following factors should be among those considered when deciding to use pesticides: risks of pesticides to health and the environment, pest population, pest risks to health and safety, and potential for economic or aesthetic damage. It is understood that these factors are difficult to assess and balance in practice.

Practices for Spill Prevention and Response – Precautions must be taken to prevent spills and prepare for spill cleanup. Mixing, loading, emptying, and rinsing should be done on an impervious surface with secondary containment. A sufficient amount of spill absorbents (*e.g.* oil dry) should be available nearby.

Applicator training

Initial training – Before an employee applies any pesticide, he or she must receive training in the areas of PPE and safety.

Follow-up training – Review of PPE and safety topics shall take place annually. If any changes (laws, equipment, PPE, etc.) occur, retraining will occur as needed, or if retraining appears necessary for any reason.

Treating pesticide exposure

Treatment methods are described on the product label or material safety data sheet (MSDS).

A safety shower and eyewash station are provided to rinse chemicals from the body after an accidental exposure.

If there are any questions about treatment, phone the pesticide manufacturer or the U.S. Poison Control Center at 1(800) 432-6866.

IDENTIFICATION GUIDE FOR PESTS AND BENEFICIAL ORGANISMS

Insects (kingdom Animalia, phylum Arthropoda, class Insecta)

Cockroaches (order Dictyoptera) – Refer to New Mexico Cooperative Extensive Service Guide G-310 for more detailed information about cockroaches.

Family Blattidae

American cockroach (*Periplaneta americana*)

Appearance: the largest house-infesting species, about 1½" long, with reddish-brown wings and light markings on the thorax. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.553.)

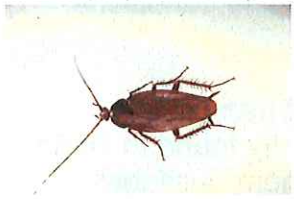
Habits: very aggressive; prefers warm, damp areas; generally nocturnal but more likely to be seen in daytime or outdoors than other species; fast-running but fly poorly.

Diet: scavenging, eats almost anything; commonly found in food preparation areas; attracted to alcoholic beverages, especially beer.

Life cycle: female needs to mate just once to produce many black egg capsules, each of which contains 14-16 eggs; capsules are produced once a week, from 15 to 90 times; eggs hatch 35-100 days after laying; reddish-brown nymphs molt 13 times in 10-15 months before reaching maturity; can live up to 2½ years.

Other: also known as water bug; actually native to Africa and introduced to the U.S. in 1625; capable of transmitting numerous diseases; ancient Romans called them "lucifuga" because of their habit of running away from light.

Smoky brown cockroach (*Periplaneta fuliginosa*)



Appearance: shiny, dark brown or mahogany; up to 1½" long; both males and females have wings longer than their bodies and are capable of flight. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: prefers to live outdoors, in humid piles of organic litter; populations are relatively immobile, compared to other species; requires high humidity or available water.

Diet: scavenging, eats almost anything; usually feeds on plant material

Life cycle: dark brown egg capsules (each containing approximately 20 eggs) hatch in 24-70 days; females mature in 320 days and produce an average of seven capsules; adults can live up to 200 days.

Other: common in the southeastern U.S.; attracted to lights at night; introduced to Florida in the mid-1800's; capable of transmitting numerous diseases; ancient Romans called them "lucifuga" because of their habit of running away from light.

Oriental cockroach (*Blatta orientalis*)

Appearance: dark brown or black; about 1" long; females are wingless, and males have wings much shorter than their bodies; both males and females are incapable of flight. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.553.)

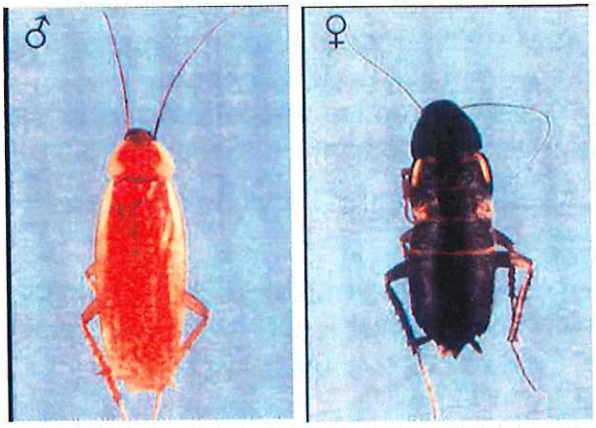
Habits: common outdoors; enter buildings through sewer pipes; live in warm, damp areas close to the ground; more tolerant of cold than other cockroaches.

Diet: scavenging, but prefers starches; frequently feed on garbage, sewage, or decaying organic matter.

Life cycle: females produce an average of eight egg capsules but may lay as many as 15, each of which contains 12-16 eggs; eggs incubate for 44 days; nymphs pass through seven instars before maturing in a year; adults live up to 180 days; total life cycle lasts 13 months.

Other: also called water bug or black beetle; more sluggish than other species; emit a distinct, unpleasant odor; capable of transmitting numerous diseases; ancient Romans called them "lucifuga" because of their habit of running away from light.

Turkestan cockroach (*Blatta lateralis*)



Appearance: $^{9}/_{16}$-1" long; yellowish-brown males have wings extending past the abdomen, but the wings of reddish-brown to black females are shorter; males resemble the American species; females are similar to the oriental species. (Images taken from http://www.infoplagas.com/Cuca_Turkestan.htm.)

Habits: tends to live in sewer systems; very tolerant of arid conditions.

Diet:

Life cycle:

Other: capable of transmitting dysentery bacteria; recently found in Doña Ana county; native to southwestern Asia; ancient Romans called them "lucifuga" because of their habit of running away from light.

Family Blatellidae

German cockroach, steamfly (*Blatella germanica*)

Appearance: about 5/8" long; light to medium brown, with two dark, longitudinal streaks on the pro-thorax; nymphs are wingless, with two dark longitudinal stripes; adults have wings but rarely fly. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.553.)

Habits: nocturnal; found close to food, moisture, and warmth; most common species in or near homes, supermarkets, and restaurants.

Diet: scavenging, eats almost anything

Life cycle: females can produce one chestnut brown egg capsule (containing 18-48 eggs) every 20-25 days; the capsule is carried by the female until shortly before hatching; this species can mature in 36 days from hatching and live up to one year.

Other: often found aboard ships; most widespread species in the U.S.A.; capable of transmitting numerous diseases; ancient Romans called them "lucifuga" because of their habit of running away from light.

Brown-banded cockroach (*Supella longipalpa*)

Appearance: up to 5/8" long; wings have brownish-yellow bands at the base; dark brown bands on the thorax are wider than those of the German species; females are darker and broader than males; wings of females are shorter than their bodies, but males' wings are longer. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.553.)

Habits: nocturnal; capable of flight; prefer dry, warm areas, high locations, or inside furniture; requires less water than German cockroach.

Diet: scavenging; eats almost anything.

Life cycle: female carries yellow or reddish-brown egg capsule (with an average of 18 eggs) for 24-36 hours and then attaches it on the side or bottom of a protected surface; most females produce ten capsules in their lives; nymphs mature in about 161 days; adults live up to ten months.

Other: sometimes confused with German cockroach; less dependent on moisture than other species; capable of transmitting numerous diseases; ancient Romans called them "lucifuga" because of their habit of running away from light.

Ants, bees, wasps, and hornets (order Hymenoptera)

Ants (family Formicidae)

Pharaoh ant (*Monomorium pharaonis*)

Appearance: very small, about 1/16" long; light yellow to red with black markings on abdomen. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: nests in any well-protected, hidden area inside structures; can nest outside but relies on heated dwellings to survive; commonly infest food service area; tendency to swarm over food is less than that of other ants.

Diet: all types of foods, especially sweets or fats; can eat other insects.

Life cycle: eggs hatch and mature in 45 days; workers live ten weeks; females live up to 39 weeks, laying about 400 eggs.

Other: most persistent and difficult to control species; colonies are very large, containing up to several million workers and thousands of queens; colonies will split if disturbed.

Odorous house ant (*Tapinoma sessile*)

Appearance: dark reddish brown to black; 1/10" long; antennae have 12 segments. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: nests in walls or floor; most likely to invade homes during rainy weather; travel in trails; forage day and night.

Diet: sweet foods.

Life cycle: each female lays one egg each day; maturity reached in 24 days; workers and females live several years.

Other: produce unpleasant odor when crushed; colonies often are large; can be driven away by invading Argentine ants; protect aphids to harvest honeydew.

North American carpenter ant (*Camponotus pennsylvanicus*)

Appearance: among the largest species, from ¼-⅜" long; black; workers have large mandibles. (Image taken from Cowling Arboretum and McKnight Prairie of Carleton College, Northfield, Minnesota.)

Habits: usually nest in dead or decaying portions of trees, stumps, or logs or in burrows under fallen logs or stones; can invade and nest in homes in search of food; primarily nocturnal.

Diet: omnivorous, especially sweet or fatty foods, but not wood; likes honeydew from aphids; also feeds on other insects.

Life cycle: winged adults develop in the fall, but swarming occurs in spring; queens lay 15-20 eggs in their first year and up to 30 eggs in their second; eggs hatch in 24 days; after three weeks, white, maggot-like larvae turn into tan, capsule-shaped pupae; adults emerge in three more weeks; worker ants live up to seven years; queens live up to 25 years.

Other: galleries in wood are so smooth as to appear to have been sandpapered; difficult to control; colonies can contain up to 3,000 workers; in mating season, males and females grow wings (resembling termites) and fly to establish new colonies.

Carpenter ant (*Camponotus vicinces*)

Appearance: ¼-1" long; reddish-black. (Image taken from The Virtual Science Centre.)

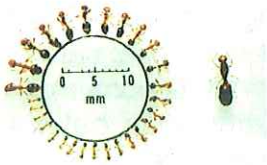
Habits: usually nest in dead or decaying portions of trees, stumps, logs, burrows under fallen logs or stones, or old homes; rarely in new construction; primarily nocturnal.

Diet: omnivorous, especially sweet foods like fruit, but not wood; also feeds on other insects; likes honeydew from aphids.

Life cycle: queens lay 15-20 eggs in their first year and up to 30 eggs in their second; eggs mature in 60 days; worker ants live up to seven years; queens live up to 25 years.

Other: galleries in wood are so smooth as to appear to have been sandpapered; difficult to control; colonies can contain up to 3,000 workers; in mating season, males and females grow wings (resembling termites) and fly to establish new colonies.

Red imported fire ant (*Solenopsis invicta*) – Refer to New Mexico Cooperative Extensive Service Guides G-319, G-320, G-321, and G-322 for more detailed information about fire ants.



Appearance: reddish, 1/16-¼" long. (Image taken from IPM World, University of Minnesota.)

Habits: mounds can spread one to two feet in diameter and one to one and a half feet tall; large colonies can contain 250,000 workers; very active and aggressive; sting intruders repeatedly; nests usually established in fields, lawns, and pastures; queens readily migrate as needed to establish new colonies.

Diet: omnivorous, known to eat insects, meats, sweets, or greasy materials.

Life cycle: new queens lay a dozen eggs, which hatch in seven to ten days; older queens lay 800-1,000 eggs per day; larvae develop six to ten days before pupating for 9-15 days; workers live up to 90 days; queens live two to six years.

Other: known to remove rubber insulation from telephone wires; sting is painful and can kill young wildlife; introduced accidentally to the United States in Alabama and have since spread throughout the southern U.S.; can nest in logs, walls, or motor vehicles.

Honeybees and bumblebees (family Apidae)

European honeybee (*Apis mellifera*)

Appearance: banded orange and black; hairy. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.525.)

Habits: form hives in hollow trees, wood piles, or debris piles; makes nests of wax; hives used for several years. Swarms, usually seen hanging in trees, are temporary gatherings of bees seeking a site for a new hive. Swarms will last just one or two days and usually won't cause injury, unless provoked.

Diet: plant nectar and pollen.

Life cycle:

Other: stings can be dangerous to individuals with allergies to the venom; stingers are left in the victim.

Africanized ("killer") honeybees (*Apis mellifera scutellata*) – Refer to New Mexico Cooperative Extensive Service Guide L-102 for more detailed information about Africanized bees.

Appearance: slightly smaller than European honeybee. (Image taken from Insects and Society, Virginia Tech.)

Habits: more aggressive than native bees or European honeybee; form hives in hollow trees, wood piles, or debris piles.

Diet:

Life cycle:

Other: sting with less provocation and more often than other species, frequently stinging *en masse*.

Bumblebee (*Bombus* spp.)

Appearance: plump-bodied with black and yellow hairs. (Image taken from The Bumblebee Pages.)

Habits: annually makes nests of wax underground.

Diet: plant nectar and pollen.

Life cycle: only fertilized queens overwinter; queens begin new nests in spring or summer; eggs hatch in three to four days; larvae grow for a week before pupating for 12 days; workers live for a month; males and new queens develop in late summer.

Other: does not leave stinger in victim; usually sting only if disturbed.

Wasps and hornets (family Vespidae)

Paper wasp (*Polistes* spp., *Mischocyttarus* spp.)

Appearance: reddish-brown or black, with yellow markings; slender; ¾-1" long. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: build single paper-like combs in eaves.

Diet: insects.

Life cycle: queen hibernates in winter then emerges in spring.

Other: disturbed by loud noises; might enter buildings in fall to find hibernation sites.

Yellow jacket (*Vespula* spp.)

Appearance: banded yellow (or orange) and black; smooth; ½–¾" long. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: annually makes nests of paper underground or inside walls; feed within 1,000 feet of the hive.

Diet: insects, discarded foods.

Life cycle: queen begins new nest in spring; only the queen overwinters.

Other: does not leave stinger in victim; disturbed by movement near nest.

Hornet (*Dolichovespula* spp.)

Appearance: black, with yellow or white markings. (Image taken from Clemson University Arthropod Collection.)

Habits: build large, gray, papery nests in trees, shrubs, or eaves.

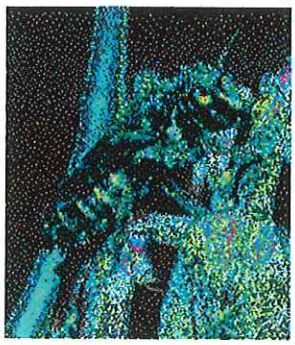
Diet:

Life cycle:

Other: usually sting only if nest is disturbed.

Other bees and wasps

Leafcutter bee (*Megachile* spp.; family Megachilidae)

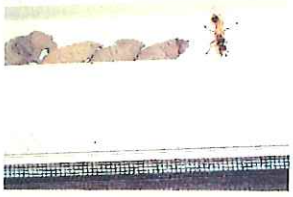


Appearance: (Image taken from North Central Regional Plant Introduction Station.)
Habits: chew rounded holes from leaves to use as nest lining; live in tunnels in stems, logs, and the ground; solitary.
Diet: pollen and nectar.
Life cycle:
Other: usually sting only if disturbed.

Carpenter bee (*Xylocopa* spp.; family Xylocopidae)

Appearance: shiny black; ¾-1¼" long. (Image taken from The Transvaal Museum.)
Habits: numerous chambers in old wood formed by burrowing.
Diet: plant nectar.
Life cycle: adults mate in mid-spring; larvae take five to six weeks to mature; overwinter as adults.
Other: males lack stingers but act aggressively; females sting only when disturbed.

Mud dauber (*Sceliphron* spp.; family Sphecidae)



Appearance: has a slender "waist". (Image taken from Chew family's Brisbane Insects and Spiders Home Page.)
Habits: makes nest of mud within plant stems, underground, or on walls; generally solitary (not hive-forming).
Diet: insects; spiders.
Life cycle:
Other: will sting only when disturbed.

Beneficial parasitic wasps (family Aphelinidae)

Encarsia spp.

Appearance: less than 0.6 mm long; males (rare) are dark; females have yellow head and thorax and dark abdomen. (Image taken from Biological Control: A Guide to Natural Enemies in North America, Cornell University.)

Habits:

Diet: adults feed on honeydew; larvae parasitize whitefly.

Life cycle: eggs do not require fertilization; eight to ten eggs laid per day, one inside each whitefly nymph; adults emerge from host after 20 days.

Other:

Eretmocerus spp.

Appearance: about one inch long; lemon yellow with green eyes. (Image taken from Biological Control: A Guide to Natural Enemies in North America, Cornell University.)

Habits: females lay eggs between whitefly nymph and leaf surface; hatching occurs three or four days later; larvae enters nymph and begins feeding once host begins pupating; adults live for one to two weeks; complete life cycle is two to three weeks.

Diet: adults eat honeydew; larvae prey on whitefly nymphs and pupae.

Life cycle:

Other: native to California and Arizona deserts.

Beneficial parasitic wasps (family Eulophidae)

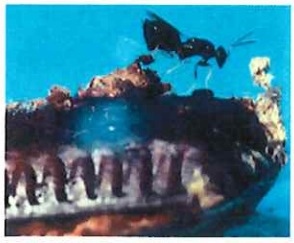
Tetrastichus brevistigma

Appearance: ⅛" long.
Habits:
Diet: Elm leaf beetle larvae and pupae.
Life cycle: one to eight eggs laid per pupa; up to 100 eggs laid by each female; larvae develop in 9-15 days; overwintering occurs as larva inside pupa; emergence occurs with first generation of Elm leaf beetle.
Other: native to northeastern U.S.A.

Tetrastichus gallerucae

Appearance: ⅛" long, with a dark metallic blue thorax and black abdomen. (Image taken from University of California Statewide Integrated Pest Management Project.)
Habits:
Diet: Elm leaf beetle eggs
Life cycle: about 17 days; several generations per season; overwinters as adult in protected areas.
Other: native to Europe.

Aprostocetus hagenowii (a.k.a. *Tetrastichus hagenowii*)



Appearance: (Image taken from Entocare.)
Habits:
Diet: American, Oriental, and German cockroach eggs.
Life cycle: young are born and mature for 32-40 days inside cockroach egg capsules; mating occurs shortly after emergence; fertilized eggs produce female offspring, and unfertilized eggs produce males; adult females survive for seven to ten days and lay eggs twice in that time.
Other:

Aphelinus mali

Appearance: black with a yellow band at the front of the abdomen. (Image taken from HortNET.)
Habits:
Diet: wooly apple aphid.
Life cycle:
Other:

Beneficial parasitic wasps (family Braconidae)

Aphidius ervi

Appearance: about 4 mm long; black with brown legs. (Image taken from Biobest Biological Systems.)

Habits:

Diet: potato aphid, foxglove aphid.

Life cycle: up to 350 eggs laid singly within aphids; development takes 12-26 days, depending on temperature; adults live about one week.

Other:

Aphidius matricariae

Appearance: ⅛" long; black with brown legs. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet: green peach aphid.

Life cycle: eggs laid and larvae develop within aphids; from 50-150 eggs laid singly in aphid nymphs; maturation takes seven to ten days.

Other: attracted to yellow, so don't use sticky cards in conjunction with this biocontrol species.

Aphidius colemani

Appearance: about 2 mm long; black with brown legs; female has pointed abdomen but male's is rounded. (Image taken from Biobest Biological Systems.)

Habits:

Diet: cotton aphid, green peach aphid, melon aphid.

Life cycle: eggs laid and larvae develop within both nymph and adult aphids; up to 400 eggs laid singly by each female; adults emerge from aphid about 11 days after eggs are laid and then live for four to five days.

Other:

Other beneficial parasitic wasps

Amitus spp. (family Platygasteridae)

Appearance: (Image taken from Kingsville Citrus Center, Texas A&M University.)
Habits:
Diet: Elm leaf beetle, whitefly.
Life cycle:
Other:

Purslane sawfly (*Schizocerella pilicornis*; family Tenthredinidae)

Appearance: (Image taken from Chester Hartsough, San Francisco State University.)
Habits:
Diet: Purslane.
Life cycle:
Other:

Psychophagus omnivorus (family Pteromalidae)

Appearance: (Image taken from Alexei Sharov, Virginia Tech.)
Habits:
Diet: fall webworm.
Life cycle:
Other:

Compere (*Comperia merceti*, family Encyrtidae)

Appearance:
Habits:
Diet: brown-banded and German cockroach egg capules.
Life cycle: fertilized eggs produce female progeny, and unfertilized eggs produce male progeny; maturity reached in 32 to 36 days; female wasps live 3 to 5 days, during which time they lay eggs in one or two hosts.
Other:

Anastatus blattidarum (family Eupelmidae)

Appearance:
Habits:
Diet: brownbanded cockroach.
Life cycle:
Other:

Moth egg parasites (*Trichogramma* spp.; family Trichogrammatidae)

Appearance: wingspan is $^{1}/_{50}$ inch. (Image taken from Beneficial Insectary.)

Habits:

Diet: Pecan nut casebearer eggs; other insect eggs (primarily Lepidoptera).

Life cycle: eggs laid inside pest eggs; larval stage for one to three days after hatching; pupal stage is three to five days.

Other:

Beetles and weevils (order Coleoptera)

Ladybird beetles, ladybugs (family Coccinellidae)

Spider mite destroyer (*Stethorus* spp.)

Appearance: adult is 1/16" long, oval, and shiny black; larva is gray to black with black patches of hairs. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.507.)

Habits:

Diet: European red and two-spotted spider mites.

Life cycle: 1/64" long, white, oval eggs laid singly in spring and summer, between one and ten per leaf; hatching occurs four to five days later; larval stage lasts 12 days, and pupal stage lasts 5 days; overwintering occurs as adult on leaf litter on ground.

Other: native to North America.

Convergent lady beetle (*Hippodamia convergens*)

Appearance: Four to seven mm long; red forewings with black dots; black and white pattern on head. (Both images taken from University of California Statewide Integrated Pest Management Project.)

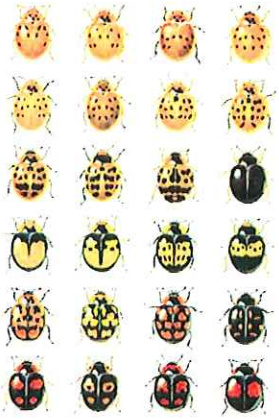
Habits:

Diet: cotton, pea, melon, cabbage, potato, green peach, and corn leaf aphids; mites; honeydew.

Life cycle: 200-1000 orange-yellow eggs laid in groups of 10-50 in spring and summer; larvae develop from 10-30 days; pupation lasts 3-12 days (depending on temperature); adults overwinter in protected locations.

Other:

Asian lady beetle (*Harmonia axyridis*)



Appearance: adults oval, 6 mm long and 5 mm wide, yellow-orange to red, with or without spots; larvae are gray to black with yellowish-orange patches. (Image taken from Oregon State University Extension Urban Entomology.)

Habits:

Diet: aphids.

Life cycle: after overwintering as adults, mating occurs in spring; yellow eggs laid in clusters of 20 and hatch after three to five days; larvae feed for 12-14 days and pupate for 5-6 days; adults can live two to three years.

Other: native to Asia.

Whitefly eater (*Delphastus pusillus*)

Appearance: adults have shiny, black, round bodies; females all black, but males have reddish-brown heads; larvae are yellow-green; pupae are yellow and round. (Image taken from Biobest Biological Systems.)

Habits:

Diet: whitefly eggs and nymphs, with spider mites on occasion.

Life cycle: adult females live for approximately one month and lay three to four clear eggs per day; pupae last six days.

Other:

Grain and flour beetles (family Tenebrionidae)

Sawtoothed grain beetle (*Oryzaephilus surinamensis*)

Appearance: dark brown; flat, broad body with saw-like projections on its sides; 1/10" long; 1/8" long, yellowish-white grubs are slender with brown heads. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.501.)

Habits:

Diet: dry foods (especially processed grain products), spices, dried fruit, and chocolate.

Life cycle: about 300 eggs laid per adult female; hatching takes 3-17 days; larvae feed for two to ten weeks; pupae exist for three weeks; life cycle may be as short as two months; adults may live for over one year.

Other: not known to fly, although it has wings.

Flour beetle (*Tribolium* spp.)

Appearance: flattened and oblong; reddish brown; 1/7" long; white to yellow grubs are 1/4" long. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.501.)

Habits: can penetrate sealed containers.

Diet: many foods but most often flour and grains.

Life cycle: females lay 300-400 eggs; grubs develop over one to two months; adults lay eggs over a five to eight month period; four to five generations per year.

Other: attracted to light; quickly hide if disturbed; spread disagreeable odor and taste to infested foods; also called bran bug.

Other beetles

Old house borer (*Hylotrupes bajulus*; family Cerambycidae)

Appearance: brownish black with black wing covers; ⅝-1" long; slightly flattened; may have white markings. (Image taken from Urban Pest Control Research Center.)

Habits: larvae feed on seasoned timber; exit holes are ¼" ovals.

Diet: wood with moisture content of 10-20%; prefers softwoods.

Life cycle: spends two to twelve years in grub stage but only 10-15 days as adult; life cycle averages three to five years.

Other: contrary to its name, it occurs mostly in houses less than ten years old.

Elm leaf beetle (*Xanthogaleruca luteola*; family Chrysomelidae) – Refer to New Mexico Cooperative Extensive Service Guide G-118 for more detailed information about elm leaf beetles.

Appearance: adults are oval, ¼" long, yellowish to olive green with a black stripe on each wing cover; young grubs are nearly black with black hairs; older grubs are ½" long, dull yellow, and have black spots on the back, black stripes on the sides, and black head and legs; pupae are ¼" long and bright yellow-orange. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.521.)

Habits: can enter buildings in fall to find a place to hibernate; slow flyers.

Diet: both grubs and adults eat the leaves of Elm trees.

Life cycle: yellow, football-shaped eggs laid in clusters of 15-35 on the bottoms of leaves, beginning in mid-spring and hatching a month later; grubs pass through three instars before pupating; pupae fall from the tree and remain on the soil surface for one to two weeks; two to four generations occur each year; overwinters in adult stage in bark crevices or buildings.

Other: Siberian Elms are extremely susceptible to the beetle; the Lacebark Elm, which has tougher leaves, is more resistant; this is not the beetle responsible for transmitting Dutch Elm Disease; native to Europe.

Soldier beetle, leatherwing (*Chauliognathus* spp., family Cantharidae)

Appearance: (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet: aphids.

Life cycle:

Other:

June beetle (*Phyllophaga* spp.; family Scarabaeidae)

Appearance: adults are ½-⅝" long and brown; grubs are creamy white with dark heads and three pairs of legs and can reach ½-1" long. (Both images taken from University of Florida Department of Entomology and Nematology.)

Habits: nocturnal; attracted to lights; grubs tend to curl into a "C" shape.
Diet: grubs feed on turf roots
Life cycle: adults emerge from soil, mate, and lay eggs in late spring or early summer; each female lays 30-40 eggs two to five inches deep in the soil; grubs hatch from eggs two weeks later; overwintering occurs as grubs; pupating occurs in spring, three to six inches below the soil surface.
Other: infested turf turns brown and separates easily from the ground; such areas are more susceptible to weed invasions; also called May beetle, depending on the time of year it appears.

Powderpost beetle (*Lyctus* spp., *Trogoxylon* spp.; family Lyctidae)

Appearance: small, slender, and flattened; reddish brown to black; ⅛-¼" long; short antennae; grubs <¼" long, cream-colored, and slightly C-shaped. (Image taken from Massey Services, Inc.)

Habits: attack the sapwood of hardwoods (especially oak, hickory, and ash); create small (pinhole size) holes in floors, furniture, molding, or fixtures; prefer woods with moisture content of 10-20%.
Diet: sugar, starch, and proteins in sapwood.
Life cycle: about one year from egg to mature adult, with majority of time in grub form; females lay from 20-50 eggs.
Other: most common species in U.S.

False powderpost beetle (*Heterobostrychus* spp., *Scobicia* spp., *Xylobiops* spp.; family Bostrichidae)

Appearance: reddish brown to black; ⅛-¼" long; elongated and slender. (Image taken from Western Exterminator Company.)

Habits: females bore tunnels to lay eggs; infest both softwoods and hardwoods but cause more damage to hardwoods.
Diet: usually new wood, less than ten years old.
Life cycle: eggs laid in tunnels; grubs usually mature in one year but can take up to five years.
Other: often found in oak, firewood, or furniture.

Carpet beetle (*Anthrenus* spp.; family Dermestidae)

Appearance: small and rounded (like ladybird beetles) or elongated; gray to black, with whitish or orange scales on back; 1/5" long; grubs are reddish brown or tan, bristled, and 1/8-1/4" long. (Image of adult taken from Colorado State University Cooperative Extension Service Fact Sheet #5.501. Image of larva taken from National Pest Management Association.)

Habits: often found in flower beds; may invade homes when brought indoors on cut flowers; can move within homes while in grub stage.

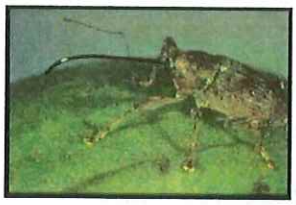
Diet: pollen and nectar outdoors; indoor products made from natural (not synthetic) fibers.

Life cycle: females lay 30-100 eggs over a period of two to three weeks, which hatch in 10-18 days; grub stage lasts 60-325 days; adults live 20-60 days.

Other: contact can cause dermatitis in humans.

Weevils (family Curculionidae)

Pecan weevil (*Curculio caryae*)




Appearance: adults two inches long; reddish-brown with pale-colored scales; long snout; larvae ⅜-2" long and off-white with reddish-brown heads. (Both images taken from Texas Agricultural Extension Service publication #B-1238.)

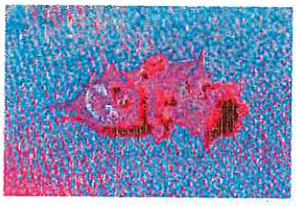
Habits:

Diet: larvae feed on developing pecan nuts.

Life cycle: grubs emerge from the nuts in fall and early winter and enter the soil for one or two years; pupation occurs during the fall of the year; new adults remain in the soil until the following summer; the complete life cycle may require two or three years.

Other:

Puncture Vine seed weevil (*Microlarinus lareynii*)



Appearance: long snout. (Image taken from Texas A&M Agricultural Research and Extension Center, Vernon, Texas.)

Habits:

Diet: Puncture Vine.

Life cycle: about 300 eggs laid, three to five per seed; larvae and pupae remain in seeds; life cycle takes about 25 days; overwinter as adult.

Other:

Puncture Vine stem mining weevil (*Microlarinus lypriformis*)

Appearance: long snout.

Habits:

Diet: Puncture Vine stems and leaves.

Life cycle: eggs deposited in pits chewed in crowns and stems; larvae feed and pupate within stems.

Other:

Smicronyx sp.

Appearance: long snout.

Habits:

Diet: young growth of dodder.

Life cycle:

Other:

Crickets and grasshoppers (order Orthoptera)

Crickets (family Gryllidae)

House cricket (*Acheta domesticus*)

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Appearance: yellowish brown with three darker brown bands on head; ½-¾" long. (Image taken from University of Florida Featured Creatures.)

Habits: nocturnal; prefer warm areas indoors; make distinctive, annoying chirping sound.

Diet: scavenging but prefers bread crumbs and liquids (including alcohol); may eat stored clothing.

Life cycle: eggs deposited singly in crevices and behind baseboards; females may lay 40-170 eggs; egg stage lasts 8-12 weeks.

Other: native to Europe.

Field cricket (*Gryllus* spp.)

Appearance: black or dark brown; ¾-1" long. (Image taken from Encarta, Microsoft.)

Habits: found in pastures, meadows, lawns, and occasionally indoors.

Diet: omnivorous but prefer grain crops and natural fabric textiles.

Life cycle: one generation per year; creamy white, cylindrical eggs, each of which is 3 mm long, hatch in May; adults mature in July or August and mate and die in September; can overwinter as adults, nymphs, or eggs.

Other: occasionally swarm in numbers so great as to cover many square miles.

False crickets and grasshoppers

Camel cricket (*Tachycines asynamorous*, *Ceuthophilus* spp.; family Gryllacrididae)

Appearance: tan to dark brown; ½-1½" long; humpbacked appearance. (Image taken from North Carolina Cooperative Extension Service Insect Note - ENT/rsc-13.)

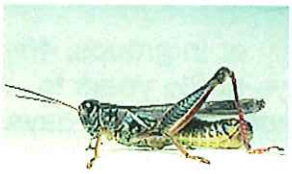
Habits: prefers cool, damp areas such as beneath logs or stones and in crawl spaces, basements, or attics; nocturnal.

Diet: omnivorous, including clothes and lace curtains.

Life cycle: eggs laid in spring and hatch in April; one generation per year.

Other: do not chirp like other species; immobilized by strong light.

Short-horned grasshopper (*Melanoplus* spp.; family Acridideae)



Appearance: (Image taken from University of Wyoming Field Guide to Common Western Grasshoppers.)

Habits: prefer hot, dry weather.

Diet:

Life cycle: eggs laid ½-2" deep in undisturbed soil in the fall; females lay 7-30 egg clusters of 8-30 eggs each; hatching usually begins in April or May and lasts through June or July; maturity takes 40-60 days from egg to adult; nymphs lack wings; adults breed one to three weeks after reaching maturity; population cycles with the climate every few years.

Other:

Butterflies and moths (order Lepidoptera)

Clothes moths (family Tineidae) – Refer to New Mexico Cooperative Extensive Service Guide G-316 for more detailed information about clothes moths.

Webbing clothes moth (*Tineola bisselliela*)

Appearance: ½" long; tan with golden scales and dark antennae; narrow wings; caterpillars are shiny and creamy white, reaching ½" long. (Image taken from University of California - Riverside Department of Entomology.)

Habits: name comes from the webbing with which the caterpillar surrounds itself as it feeds; prefers darkness.

Diet: natural fabrics (clothing or upholstery), carpets, animal skins, or feathers.

Life cycle: females live less than one month; eggs laid singly or in groups, 40-50 at a time; eggs hatch in less than a month but take from 35 days to 2½ years to reach maturity; pupal stage lasts from 55 days to four years but usually is 65-90 days.

Other:

Casemaking clothes moth (*Tinea pellionella*)

Appearance: cream-colored caterpillars <½" long; adults ½" long; light brown with three light spots on each wing. (Both images taken from Tineidae of Australia.)

Habits: name comes from the protective cocoon a caterpillar forms as it develops and prepares to pupate; prefers darkness.

Diet: natural fabrics (clothing or upholstery), carpets, animal skins, or feathers.

Life cycle: adults live just four to six days; females lay 37-48 creamy white eggs that soon turn red; pale yellow caterpillars hatch in four to seven days and develop from 68-87 days; pupae last 9-19 days.

Other:

Pyralid moths (family Pyralidae)

Indian meal moth (*Plodia interpunctella*)

Appearance: ½" long, with ⅝" wingspan; pale gray with reddish brown forewings; dirty white caterpillars are ½" long. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: mostly nocturnal.

Diet: coarse grains, dried fruit, spices, and chocolate; rarely flour.

Life cycle: females lay 200-400 eggs in spring; life cycle lasts four to six weeks, with only one to two weeks in the adult stage; three to six generations per year.

Other: pupate in webbing, which contaminates more food than that which is consumed; often mistaken for clothes moths.

Piñon tip moth (*Dioryctria albovittella*)

Appearance: Adults are gray; larvae are tan with brown heads.

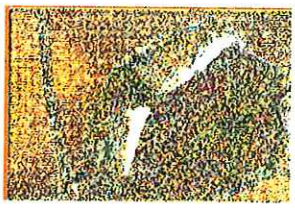
Habits:

Diet: emerging shoots of Piñon trees.

Life cycle:

Other:

Pecan nut casebearer (*Acrobasis nuxvorella*) – Refer to New Mexico Cooperative Extensive Service Guide H-650 for more detailed information about Pecan nut casebearer.



Appearance: adults gray to black; ⅓ inch long; larvae olive-gray to jade green and reach about ½ inch in length. (Image taken from New Mexico State University Climate Center.)

Habits: nocturnal.

Diet: larvae feed on buds and new fruits of Pecan.

Life cycle: overwinters as a small larva in a cocoon; in spring, larvae feed on new shoots then pupate in stems; adults emerge in April or May and live about one week; 50-150 greenish-white eggs laid shortly after pollination and fruit initiation; hatching occurs four to five days later; larval stage lasts four to five weeks inside the nut; pupal stage lasts one to two weeks, also inside nuts; two to four generations per year.

Other:

Case-bearers (family Coleophoridae)

Russian Thistle leaf miner (*Coleophora klimeschiella*)

Appearance: adults are creamy-white; hold antennae back over body; later stages of larvae form cases from hollowed leaves.

Habits:

Diet: Russian Thistle; larvae feed by attaching the case to a leaf, feeding through the epidermis, then hollowing out the leaf; a single larva destroys 15-21 leaves during its development.

Life cycle: overwinter as larvae (case stage) in stems; emerge in spring along with Russian Thistle; mating and egg laying occurs shortly after emergence; over 100 eggs laid singly on leaves and axils; hatching occurs about a week later; larval stage lasts three weeks; pupal stage lasts slightly over a week; adults survive nearly two weeks.

Other: native to Asia.

Russian Thistle stem borer (*Coloephora parthenica*)

Appearance: adults are creamy-white; extend antennae forward.

Habits:

Diet: Russian Thistle.

Life cycle:

Other: native to Asia.

Bell moths and leaf rollers (family Tortricidae)

Hickory shuckworm (*Cydia caryana*)

Appearance: gray to black; ⅜ inch long with ½ inch wing span. (Image taken from Tree Help.)

Habits: nocturnal

Diet: Pecan, Hickory, and Black Walnut.

Life cycle: overwinter as mature larvae on trees or ground; pupation occurs as temperatures rise; adults emerge in March or April; eggs deposited singly on pecan nuts and sealed down with a gelatin-like material, which creamy, chalky white; hatching occurs about one week later; off-white larvae with reddish-brown heads and black abdominal spots burrow into developing fruits; ¼-⅓ inch long, tan pupae form inside fruit.

Other: native to the U.S.

Pine tip moth (*Rhyacionia* spp.)

Appearance: (Image taken from Oklahoma State University Cooperative Extension Service.)

Habits:

Diet: caterpillars eat emerging shoots of various Pine species

Life cycle: adult moths emerge, mate, and lay eggs each spring; caterpillars feed late spring to early summer; pupae overwinter on the tree trunk, just below the soil line; one generation per year.

Other: trees remain healthy, but appearance and growth are diminished.

Other moths

Fall webworm (*Hyphantria cunea*; family Lasiocampidae)

Appearance: adults are white; wingspan is 1-1½" wide; caterpillars are one inch long, pale green or yellow, and have tufts of long white and black hairs; heads of caterpillars are either orange or black. (Both images taken from Alexei Sharov, Virginia Tech.)

Habits: webbing is produced by caterpillars.

Diet: leaves of Cottonwoods, Poplars, and other broadleaf trees; never conifers.

Life cycle: pupae in soil or on rough bark overwinter; mating occurs in the spring; up to 600 eggs can be laid at one time; two to four generations occur in the summer and fall; life cycle takes about 50 days.

Other: webbing is unsightly but not fatal; over time, trees may be stressed and experience inhibited growth; native to North America.

Bindweed moth (*Tyta luctuosa*; family Noctuidae)

Appearance: (Image taken from Moths and Butterflies of Europe.)

Habits:

Diet:

Life cycle: lasts 40-60 days; about 400 eggs laid per female.

Other:

Flies, midges, mosquitoes, and gnats (order Diptera)

Gnats

Fungus gnats (families Mycetophilidae and Sciaridae)

Appearance: adults dark gray or black, 1/16-1/8" long, with gray or clear wings; larvae have nearly clear bodies with shiny, black heads. (Both images taken from University of California Statewide Integrated Pest Management Project.)

Habits: common in overwatered houseplants.

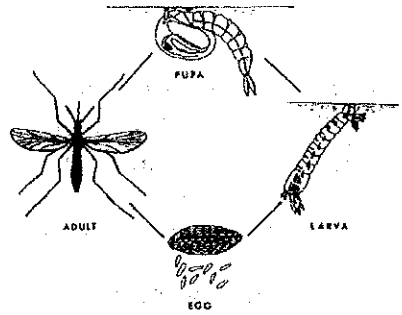
Diet: grubs eat organic matter, sometimes plant roots; adults feed on water or nectar.

Life cycle: eggs laid in most organic matter; several generations per year.

Other:

Mosquitoes (family Culicidae)

Mosquito (*Aedes* spp., *Culex* spp., *Anopheles* spp.)



Appearance: slender; ⅛-½" long; long legs; color varies by species. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.526.)

Habits: breed in areas of standing water.

Diet: adult females eat blood; adult males feed on flower nectar; larvae feed on plankton or other larvae.

Life cycle: eggs, larvae, and pupae live entirely in water; eggs laid in groups of 50-200; hatching occurs in two to three days; larval stage lasts for a week; larvae feed on organic matter and periodically surface for air; pupation takes two to three days; adults mature in one or two days.

Other: known to transmit some diseases, such as encephalitis, malaria, and heartworm (in dogs), but not AIDS; itching occurs where a person has been bitten.

Beneficial parasitic flies

Erynniopsis antennata (family Tachinidae)

Appearance: adults are black; pupae are reddish black and cylindrical or teardrop-shaped. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet: Elm leaf beetle.

Life cycle: pupation occurs in summer; adults overwinter within host.

Other:

Flower flies, hover flies (family Syrphidae)

Appearance: adults blue or black with white or yellow stripes, resembling bees. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet: maggots parasitize Elm leaf beetle.

Life cycle:

Other:

Beneficial predatory midges (family Cecidomyiidae)

Aphidoletes aphidimyza

Appearance: adults two to three mm long, with long legs like mosquitoes; orange maggots are also two to three mm long. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: adults are nocturnal.

Diet: larvae eat aphids; adults eat honeydew.

Life cycle: females lay up to 70 orange eggs individually or clustered on leaves; they hatch two to four days later; larvae develop for two weeks, followed by a three week pupal stage in the soil; overwintering occurs as pupae; three to six generations per year.

Other: native to North America.

Feltiella acarivora

Appearance: (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet: spider mites.

Life cycle:

Other:

Book lice and bark lice (order Psocoptera)

Book lice (families Liposcelidae and Trigiidae)

Book louse (Liposcelis spp.)

Appearance: colorless to gray or light brown; $^{1}/_{25}$-$^{1}/_{12}$" long; may or may not have wings. (Image taken from Dennis Kunkel Microscopy.)

Habits: prefer damp, warm areas in grass or leaves and moldy areas.

Diet: microscopic molds and starchy pastes or glues (such as book bindings and wallpapers).

Life cycle: females produce 120-456 offspring; lifespan lasts 24-110 days.

Other: most numerous in spring and summer.

Piercing-sucking insects (order Homoptera)

Aphids (family Aphididae)

Wooly apple aphid (*Eriosoma lanigerum*)

Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; yellowish-red or reddish-brown with a bluish-white, waxy coating; legs and heads are darker than bodies. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: plants in the rose family and elms.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems; native to North America.

Green apple aphid (*Aphis pomi*)

Appearance: green; 1/16-1/8" long; can have wings or be wingless; males are elongated, and females are rounded; legs and antennae are very short. (Image taken from Utah State University Cooperative Extension Service.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: plants in the rose family.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as black eggs, which hatch in the spring; 1-20 live young can be born per day; up to 16 generations per year.

Other: plants suffer deformed leaves, fruits, and stems.

Green peach aphid (*Myzus persicae*)

Appearance: 1/16-1/8" long; usually wingless; shape varies; legs and antennae are very short. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: various plants.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as adults or shiny, black eggs; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems

Rosy apple aphid (*Dysaphis plantaginea*)

Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; greenish purple to mauve, with white hairs. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: Apple and Plantain.

Life cycle: can reproduce by shiny, black eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems.

Mealy plum aphid (*Hyalopterus pruni*)

Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; pale green with a waxy coating. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet:

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems

Black cherry aphid (*Myzus cerasi*)

Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; dark brown to black. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: cherry trees or plants in the mustard family.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems

Rose aphid (*Macrosiphum rosae*)

Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; pink, purple, or green, with black legs. (Image taken from University of California - Irvine.)

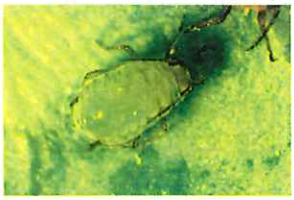
Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: rose plants or Pyracantha.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems

Potato aphid (*Macrosiphum euphorbiae*)



Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; pink, green and pink, or green with a dark stripe. (Image taken from HYPPZ, Hypermédia en Protection des Plantes - Zoologie.)

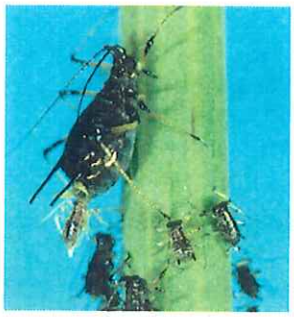
Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: various plants.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems

Cotton aphid, melon aphid (*Aphis gossypii*)



Appearance: 1/16-1/8" long; can have wings or be wingless; shape varies; legs and antennae are very short; medium to dark green. (Image taken from Texas A&M University Extension Entomology.)

Habits: slow moving; excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves or succulent new growth.

Diet: various plants.

Life cycle: can reproduce by eggs or asexually with live young; maturity reached in four to ten days; lifespan is up to one month; overwinter as black eggs, which hatch in the spring; 1-20 live young can be born per day.

Other: plants suffer deformed leaves, fruits, and stems

Whiteflies (family Aleyrodidae)

Greenhouse whitefly (*Trialeurodes vaporariorum*)

Appearance: yellow, with waxy, white wings; 1/25" long. (Image taken from Clemson University Department of Entomology.)

Habits: excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves.

Diet: sap of most plants.

Life cycle: a week after mating, each female lays over 100 dark purple or black eggs (each 1/100" long) in her life; eggs hatch a week after being laid; nymphs feed in one location and do not move for 9-17 days before adulthood; adults live 21-40 days; new generations can be completed in a two to four weeks.

Other: weak flyer, so quickly lands elsewhere when disturbed.

Sweet potato whitefly (*Bemisia tabaci*)

Appearance: yellow, with waxy, white wings; 1/25" long; red eyes. (Both images taken from U.K. Department for Environment, Food, and Rural Affairs.)

Habits: excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves.

Diet: sap of most plants.

Life cycle: between 28 and 300 brown, pear-shaped eggs laid; eggs hatch 5-22 days later; oval, creamy white or light green nymphs feed for two to four weeks in one location and do not move; nymphs pass through a short dormancy before adulthood; new generations can be completed in a 15-70 days.

Other: weak flyer, so quickly lands elsewhere when disturbed; attracted to the color yellow.

Silverleaf whitefly (*Bemisia argentifolii*)

Appearance: yellow, with waxy, white wings; 1/25" long; red eyes; extremely similar to sweet potato whitefly. (Image taken from Texas A&M Agricultural Extension Service.)

Habits: excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves.

Diet: sap of most plants.

Life cycle: between 28 and 300 brown, pear-shaped eggs laid; eggs hatch 5-22 days later; oval, creamy white or light green nymphs feed for two to four weeks in one location and do not move; nymphs pass through a short dormancy before adulthood; new generations can be completed in 18-31 days.

Other: weak flyer, so quickly lands elsewhere when disturbed.

Ash whitefly (*Siphoninus phillyreae*)

Appearance: yellow, with waxy, white coating; 1/25" long. (Image taken from University of Florida Featured Creatures.)

Habits: excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves.

Diet: sap of most plants.

Life cycle: eggs hatch one week after being laid; nymphs feed for two to four weeks in one location and do not move; nymphs pass through a short dormancy before adulthood.

Other: weak flyer, so quickly lands elsewhere when disturbed.

Banded wing whitefly (*Trialeurodes abutlonea*)

Appearance: yellow, with waxy, white coating; 1/25" long.

Habits: excrete a sugary substance commonly called "honeydew", which serves as the host for sooty mold and is attractive to some ants; usually found on underside of leaves.

Diet: sap of most plants.

Life cycle: nymphs feed for two to four weeks in one location and do not move; nymphs pass through a short dormancy before adulthood.

Other: weak flyer, so quickly lands elsewhere when disturbed.

Spittlebugs (family Cercopidae)

Western spittlebug (*Clastoptera juniperina*)

Appearance: ⅛-½" long; torpedo shaped; adults are dark brown or black; nymphs are ivory with brown head. (Image taken from United States Forest Service.)

Habits: nymphs surround themselves with a protective froth.

Diet: sap of many plants.

Life cycle: eggs laid in late summer; hatching occurs in spring; one generation per year.

Other:

Pecan spittlebug, froghoppers (*Clastoptera achatina*)

Appearance: adults reddish-brown, 1/12" long. (Image taken from Clemson University Cooperative Extension Service.)

Habits: nymphs surround themselves with a protective froth.

Diet: pecan trees.

Life cycle: overwinters as eggs; nymphs hatch in spring

Other:

True bugs (order Hemiptera)

Box elder bug (*Leptocoris trivittatus*; family Rhopalidae)

Appearance: adults black, with three longitudinal, red stripes on thorax and red edges of wings; ½" long; nymphs bright red. (Image taken from Clemson University Department of Entomology.)

Habits:

Diet: sap of Box Elder and other Maples, Ash, or fruit trees.

Life cycle: red eggs hatch 10-14 days after laying, usually with emergence of leaves in spring; two generations per year; overwinter as adults in protected areas, such as the interior of houses.

Other: feed on house plants in winter.

Minute pirate bug (*Orius tristicolor*; family Anthocoridae)

Appearance: adults are oval, ⅛" long, black with white wing patches; nymphs are yellow-brown and teardrop-shaped. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #5.507.)

Habits:

Diet: aphids, spider mites, thrips.

Life cycle: adults emerge in spring after overwintering; eggs are laid two to three days after mating; eggs hatch three to five days later; maturity reached in about 20 days; adults live for 35 days; females can lay over 100 eggs.

Other: might bite humans, but the bite is not dangerous.

Big-eyed bug (*Geocoris* spp.; family Lygaeidae)

Appearance: oval bodies; short antennae; bulging eyes; $^{3}/_{16}$" long. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet: whiteflies, mites, aphids, and caterpillars.

Life cycle: overwinter as adults; cylindrical, off-white eggs with a red spot laid singly and hatch one week later; nymphal stage lasts four to six days; adults live about 30 days; females can lay 300 eggs; several generations per year.

Other:

Macrolophus caliginosus (family Miridae)

Appearance: adults pale green with a whitish hairiness; larvae green with red eyes. (Image taken from Biobest Biological Systems.)

Habits:

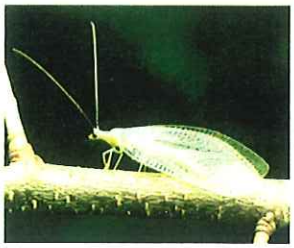
Diet: whitefly larvae and eggs (also aphids and spider mites).

Life cycle:

Other:

Veined wing insects (order Neuroptera)

Green Lacewings (family Chrysopidae)




Appearance: light green; transparent wings longer than body; gold or copper colored eyes; ¼-¾" long; larvae are gray or brown, <¼" long, and have a pattern resembling an alligator. (Image of adult taken from University of Nebraska - Lincoln Department of Entomology. Image of larva taken from University of California Statewide Integrated Pest Management Project.)

Habits: some species' larvae camouflage themselves with debris on their backs.

Diet: larvae consume aphids, spider mites, thrips, whiteflies, and various larvae; adults feed on pollen, nectar, and honeydew.

Life cycle: greenish-gray eggs on stalks, less than one mm long, laid singly in spring and summer; larvae hatch three to six days later and live two to three weeks before pupating in a cocoon for 10-14 days; adults live one to three months; two to five cycles per year; overwinter as adults on leaf litter.

Other: native to Africa; larvae called "aphid lions".

Brown Lacewings (family Hemerobiidae)


Appearance: adults are light brown, ¼-¾" long, with transparent wings longer than body. (Image of adult taken from Bioimages Virtual Field Guide. Image of larva taken from University of Florida Featured Creatures.)

Habits:

Diet:

Life cycle:

Other: less commonly observed than green lacewings; native to Africa.

Thrips (order Thysanoptera)

Predatory thrips (family Aeolothipidae)

Six-spotted thrips (*Scolothrips sexmaculatus*)

Appearance: Long, slender, pale amber, translucent body with six, brown spots. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits:

Diet:

Life cycle:

Other:

Banded-wing thrips (*Aeolothrips fasciatus*)

Appearance: (Image taken from University of California Cooperative Extension Service.)

Habits:

Diet:

Life cycle:

Other:

Termites (order Isoptera)

Higher termites (family Termitidae)

Wheeler's desert termite (*Amitermes wheeleri*)

Appearance: queens have greatly enlarged abdomens for massive egg production; dark brown reproductives are 11 mm long with wings and 5-6 mm long without wings; soldiers have jaws curved inwards with an obvious inner tooth and are approximately 4 mm long, with jaws shorter than its head. (Image taken from University of Toronto Urban Entomology Program.)

Habits: colonies composed of castes of workers, soldiers, nymphs, and larvae; build dark carton over feeding sites; prefer wood that is buried or directly contacts soil.

Diet: wide variety of desert plants and materials such as fences, dead grass, or weeds.

Life cycle:

Other: "Isoptera" comes from "iso" which means "equal" and "ptera" which means "wing" and refers to the mating adults which possess two pairs of equal length wings ; able to digest cellulose with the assistance of symbiotic intestinal protozoa and bacteria; do not cause structural damage.

Desert termites (*Gnathamitermes tubiformans*)

Appearance: workers are ⅜ inch long, creamy-white with brown heads. (Image taken from University of Toronto Urban Entomology Program.)

Habits: colonies composed of castes of workers, soldiers, nymphs, and larvae; constructs fragile tubes and sheetings around the surfaces of its food; do not tunnel into wood, but rather remove only surface materials; nocturnal.

Diet: herbaceous and woody plants, litter, dung, and fence posts, usually in uncultivated, natural ecosystems.

Life cycle:

Other: "Isoptera" comes from "iso" which means "equal" and "ptera" which means "wing" and refers to the mating adults which possess two pairs of equal length wings ; able to digest cellulose with the assistance of symbiotic intestinal protozoa and bacteria.

Dampwood termites

Arizona dampwood termite (*Zootermopsis laticeps*, family Hodotermitidae)

Appearance: reddish-brown to black; about one inch long; soldiers have black mandibles; nymphs are light yellowish-gray/brown with a mottled gray/brown abdomen which is wider than the head, and the head is wider than the thorax.

Habits: colonies composed of castes of workers, soldiers, nymphs, and larvae.

Diet:

Life cycle:

Other: "Isoptera" comes from "iso" which means "equal" and "ptera" which means "wing" and refers to the mating adults which possess two pairs of equal length wings ; able to digest cellulose with the assistance of symbiotic intestinal protozoa and bacteria; dampwood termites require moisture in the wood they consume.

Desert dampwood termite (*Paraneotermes simplicicornis*; family Kalotermitidae)

Appearance: narrow tubular body; soldiers have short, stout mandibles. (Image taken from University of Toronto Urban Entomology Program.)

Habits: colonies composed of castes of workers, soldiers, nymphs, and larvae; frass is cone-shaped; directed trail-following behaviour; infests wood at or below grade level.

Diet:

Life cycle:

Other: "Isoptera" comes from "iso" which means "equal" and "ptera" which means "wing" and refers to the mating adults which possess two pairs of equal length wings ; able to digest cellulose with the assistance of symbiotic intestinal protozoa and bacteria; sometimes kill living shrubs and trees; have a pungent odour; dampwood termites require moisture in the wood they consume.

Western subterranean termite (*Reticulitermes hesperus*, family Rhinotermitidae)

Appearance: winged reproductives are dark brown to black and ⅜ inch long; workers are grayish-white and ¼-⅜ inch long; soldiers are creamy, seven mm long, and have brownish, rectangular heads that are at least two times longer than wide and prominent mandibles that lack teeth. (Image taken from Ozane Termite and Pest Control.)

Habits: colonies composed of castes of workers, soldiers, nymphs, and larvae; often builds earthen-like tubes across concrete foundations to reach wood sources; soil is often left in the galleries they form.

Diet: wooden structures of all types.

Life cycle: swarming occurs diurnally in the spring; males and females pair off to dig underground cells then mate; the female produces an average of ten eggs in the first batch, which develop in 50 to 56 days; there are four to seven instars (the first lasts 14-18 days, the second 14-18 days, the third 30 days, and the fourth about 60 days); nymphal development normally requires 5 months; workers can live three to five years.

Other: "Isoptera" comes from "iso" which means "equal" and "ptera" which means "wing" and refers to the mating adults which possess two pairs of equal length wings; able to digest cellulose with the assistance of symbiotic intestinal protozoa and bacteria; normally, swarmers are not produced until the third or fourth year; the number of individuals in a single colony varies from three to four thousand; subterranean termites must have contact with the soil in order to survive and are the most destructive type of termite to human carpentry.

Arachnids (kingdom animalia, phylum Arthropoda, class Arachnida)

Spiders (order Araneae)

Western black widow (*Latrodectus hesperus*; family Theridiidae)

Appearance: females are black, with juveniles tending towards orange or red, males usually creamy or tan; females are 1½" long; males are less than 1" long; eight eyes arranged in two rows; two reddish triangles on bottom of abdomen form an hourglass figure; hairless. (Both images taken Peter J. Bryant, University of California - Irvine.)

Habits: prefers undisturbed sites (basements, garages, debris piles, utility boxes); will bite humans if threatened; nocturnal; webs not made in a distinct pattern.

Diet: insects, spiders (including other black widows), sowbugs, centipedes.

Life cycle: ½" long oval egg sacs contain 25 to over 900 eggs, which hatch in two to three weeks; maturity takes two to three months; adults die in autumn.

Other: venom will cause severe illness, sometimes death; newly hatched spiders might cannibalize; both genders have venom.

Tarantula (*Aphonopelma* spp., family Theraphosidae)

Appearance: brown to black; hairy; bodies are the size of a quarter dollar; total size (including legs) can be over three inches; females are larger than males. (Left image taken from A Cyberhome for DiddyBo. Right image taken from Aphonopelma Species and Other Invertebrates.)

Habits: nocturnal; live in burrows or sheltered areas.

Diet: insects; need water to drink.

Life cycle: adults live 15-20 years.

Other: non-poisonous; sometimes kept as pets; can crawl up glass.

Brown spiders (*Loxosceles* spp.; family Sicariidae)

Appearance: body is ¼-½" long; body and legs are the diameter of a quarter dollar; light to medium brown; might have indistinct, brown, violin-shaped marking on head; six eyes arranged in three pairs, in a semicircle. (Upper left image taken from David B. Richman, New Mexico State University. Right image taken from University of California - Riverside Department of Entomology. Lower left image taken from Dermatology Online Journal.)

Habits: outside, in debris piles; inside, in garages, basements, or little-used corners; nocturnal.

Diet: insects.

Life cycle: mature after about 1 year and average a 2- to 4-year life span; well known for surviving long periods (6-12 months) without food before perishing.

Other: the brown recluse (*Loxosceles reclusa*) is not indigenous to New Mexico; the venom of the native species is less potent.

Spitting spider (*Scytodes thoracica*, family Scytodidae)

Appearance: six eyes; light brown body with black spots or stripes; legs are long with black rings; two body segments are nearly the same size; 10-15 mm long. (Image taken from David B. Richman, New Mexico State University.)

Habits: sneaks very slowly within firing range and then, from glands in its head, shoots a jet of poisonous webbing in a zig-zag pattern over its prey, immobilizing and poisoning it in seconds; nocturnal; found in dark, humid areas such as beneath rocks and piles of leaves, sometimes near buildings where prey can be found.

Diet: insects, sowbugs.

Life cycle: mating occurs in spring.

Other: not poisonous.

European sowbug-eating spider (*Dysdera crocata*, family Dysderidae)

Appearance: abdomen creamy or gray, rest of body reddish brown; 10-15 mm long. (Image taken from David B. Richman, New Mexico State University.)

Habits: found in dark, humid areas such as beneath rocks and piles of leaves, where its prey is usually found; nocturnal.

Diet: sowbugs and insects.

Life cycle:

Other: native to Europe.

Yellow garden spider (*Argiope aurantia*; family Araneidae)

Appearance: blotched or striped with orange, black, yellow, and silver; the body of a female is ¾-1⅛" long with very long legs; males are ¼-⅜". (Image taken from Natural History of Orange County, California.)

Habits: web can reach two feet in diameter, with a small, central portion that is interwoven; diurnal; build webs in sunny areas between plants; spider hangs head down in center of web, waiting for prey.

Diet: flying insects.

Life cycle: mating occurs in late summer; female lays a brown egg sac containing 300-1,400 eggs and then dies; eggs hatch in the fall but young spiders remain in the sac through winter and emerge in the spring.

Other: native to North America.

Jumping spiders (*Phidippus* spp., family Salticidae)

Appearance: eight eyes, four large ones on the face and four small ones on top of head; up to ½" long. (Top images taken from David B. Richman, New Mexico State University. Bottom image taken from The Ohio State University - Marion.)

Habits: diurnal; do not spin webs but do create sacs for protection at night.

Diet: insects and other spiders.

Life cycle:

Other: may bite humans, but not poisonous; many species endemic to New Mexico.

Mites (order Acari)

Spider mites (family Tetranychidae)

Two-spotted spider mite (*Tetranychus urticae*)

Twospotted spider mite male waiting for female to emerge from her last nympho-chrysalis stage.

Appearance: <1/50" long; eight legs; can be green, reddish-brown, or nearly transparent, with two spots on body. (Image taken from National IPM Network - North Carolina.)

Habits: spin webbing on plants; prevalent in arid climates.

Diet: various plants.

Life cycle: eggs are laid in webbing by leaf veins, 12 per day; eggs hatch within a week; maturity reached in one to two weeks; life span is four to six weeks; numerous generations per year; overwinter as eggs on fallen needles or under bark.

Other:

Spruce spider mite (*Oligonychus ununguis*)

Spruce spider mites feeding on juniper.

Appearance: <1/50" long; eight legs; dark green or brown. (Image taken from National IPM Network - North Carolina.)

Habits: spin webbing on plants; prevalent in arid climates.

Diet: conifers.

Life cycle: reddish-brown eggs hatch in spring; life span is 30 days; each female can lay 50 eggs; several generations per year; overwinter as eggs on small branches.

Other:

Pine spider mite (*Oligonychus subnudus*)

Appearance: <1/50" long; eight legs.

Habits: spin webbing on plants; prevalent in arid climates.

Diet: Pine.

Life cycle: eggs are laid by leaf veins, 12 per day; eggs hatch within a week; life span is four to six weeks.

Other:

Cedar spider mite (*Platytetranychus libocedri*)

Appearance: <1/50" long; eight legs.

Habits: spin webbing on plants; prevalent in arid climates.

Diet: Arborvitae and Juniper.

Life cycle: eggs are laid by leaf veins, 12 per day; eggs hatch within a week; life span is four to six weeks; overwinter as eggs on fallen needles or under bark.

Other:

Honeylocust spider mite (*Platytetranychus multidigituli*)

Appearance: <1/50" long; eight legs. (Image taken from Tree Help.)
Habits: spin webbing on plants; prevalent in arid climates.
Diet: plant sap; tend to prefer Honeylocusts.
Life cycle: eggs are laid by leaf veins, 12 per day; eggs hatch within a week; life span is four to six weeks.
Other:

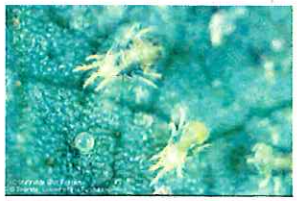
McDaniel spider mite (*Tetranychus mcdanieli*)

Appearance: <1/50" long; eight legs; several dark spots on body. (Image taken from Utah State University Department of Biology.)
Habits: spin webbing on plants; prevalent in arid climates.
Diet: Apple.
Life cycle: eggs are laid by leaf veins, 12 per day; eggs hatch within a week; life span is four to six weeks.
Other:

Pacific spider mite (*Tetranychus pacificus*)

Appearance: <1/50" long; eight legs; yellowish-green. (Image taken from University of California Cooperative Extension Service.)
Habits: spin webbing on plants; prevalent in arid climates.
Diet: various broadleaf plants.
Life cycle: eggs are laid by leaf veins, 12 per day; eggs hatch within a week; life span is four to six weeks; overwinters as mature orange-red female in bark.
Other:

Strawberry spider mite (*Tetranychus atlanticus*)



Appearance: <1/50" long; eight legs; dark red. (Image taken from University of California Cooperative Extension Service.)
Habits: spin webbing on plants; prevalent in arid climates.
Diet: various broadleaf plants.
Life cycle: eggs are laid by leaf veins, 12 per day; eggs hatch within a week; life span is four to six weeks.
Other:

Predatory mites (family Phytoseiidae)

Western predatory mite (*Galendromus occidentalis*)

Appearance: red or brown (depending on color of prey); pear-shaped; eight legs. (Image taken from University of California Cooperative Extension Service.)

Habits:

Diet: eat one to three adult spider mites or six eggs daily.

Life cycle: each female lays about 20 eggs, which hatch one to four days later; maturity reached in one to two weeks after hatching; life span is 30 days; eight to ten generations per year; overwinters as mated females on bark and leaf litter.

Other:

Phytoseiulus persimilis

Appearance: reddish-orange; teardrop shaped. (Image taken from University of California Cooperative Extension Service.)

Habits: fast moving.

Diet: can eat 20 spider mite eggs or five adults daily.

Life cycle: females lay up to 60 eggs, which hatch in two to three days; females can lay eggs at any time after being fertilized a single time; maturity reached in 5-25 days (depending on temperature); life span is 50 days.

Other: native to South America.

Mesoseiulus longipes

Appearance:
Habits:
Diet: spider mite.
Life cycle:
Other:

Neoseiulus californicus

Appearance:
Habits:
Diet: spider mite.
Life cycle:
Other:

Typhlodromus caudiglans

Appearance:
Habits:
Diet: spider mite.
Life cycle:
Other:

Neoseiulus fallacis

Appearance: pear-shaped; red or brown (depending on color of prey). (Image taken from Biological Control: A Guide to Natural Enemies in North America, Cornell University.)

Habits:

Diet: spider mite.

Life cycle: mated females overwinter in tree bark then emerge in spring and lay 20-60 eggs; eggs hatch in two to three days; maturity occurs in one to two weeks; life span is 20 days; several generations per year.

Other: native to North America.

Other predatory mites

Yellow predatory mite (*Zetzellia mali*; family Stigmaeidae)

Appearance: reddish-yellow; diamond-shaped. (Image taken from Biological Control: A Guide to Natural Enemies in North America, Cornell University.)

Habits: slow moving.

Diet: spider mite.

Life cycle: yellow eggs hatch and reach maturity in 16 days; four generations per year; overwinters as mated female in bark crevices.

Other: native to North America.

Bindweed gall mite (*Aceria malherbae*; family Eriophyidae)

Appearance: adults are yellow-white and wormlike; 2 mm long. (Image taken from Andy Hollon, Oklahoma State University.)

Habits: form protective galls during feeding from late spring until autumn; slow moving.

Diet: adults and nymphs feed on actively growing leaves and buds.

Life cycle: adults and nymphs overwinter in root buds; survive and feed throughout the growing season.

Other: native to Europe.

Scorpion (order Scorpiones)

North American scorpions (families Buthidae, Diplocentridae, Iuridae, and Superstitioniidae)

Scorpions native to New Mexico (*Superstitiona* spp., *Hadrurus* spp., *Anuroctonus* spp., *Diplocentrus* spp., *Isometrus* spp., *Centuroides* spp.)

Appearance: ½-7" long; slender body; all species have four legs, two large pincers, and a segmented tail (usually arched over the back) ending in a stinger; eyes are very small; color ranges from tan through brown to black. (Image taken from New Mexico State University College of Agriculture and Home Economics.)

Habits: usually nocturnal; hide under boxes or debris or within walls; will sting if disturbed; hides in moist areas during the day; enter buildings if habitat is disturbed.

Diet: insects, spiders, centipedes, or other scorpions; can survive up to two years without food or water.

Life cycle: mate in fall or spring; eggs develop inside the female, and young are born live in semi-transparent sacs; unborn young are carried for five months to a year; 14-100 young are born per litter; young are capable of stinging at birth; maturity takes one year; life span is three to five years.

Other: poisonous venom, which is usually not fatal but more dangerous to children and people with an allergy to it.

Birds (kingdom Animalia, phylum Chordata, class Aves)

Songbirds (order Passeriformes)

Great-tailed grackle (*Quiscalus mexicanus*; family Icteridae)

Appearance: males are purplish-black and 18" long; females are dark brown to black and 15" long; males have longer tails; eyes of both genders are yellow; they resemble crows but are smaller. (Image taken from Pima Community College.)

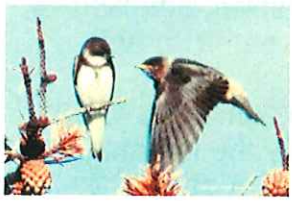
Habits: non-migratory; noisy call is a loud cacophony of clear whistles and rattling notes (particularly around dusk and dawn, when roosting); found in inland second-growth and agricultural habitats; nest from 10-30 feet off the ground.

Diet: omnivorous, primarily insects and seeds.

Life cycle: three to five eggs per clutch, which are incubated for 13-14 days by the female parent alone; fledging occurs from 20-23 days.

Other: native to North and South America (range is slowly expanding); accumulation of droppings can transmit histoplasmosis.

Cliff swallow (*Hirundo pyrrhonota*; family Hirundinidae)



Appearance: five to six inches long; squared tail; metallic, dark blue head and back; tan stomach. (Image taken from Birds of the Central Brazos Valley.)

Habits: construct nests out of mud under a protective overhang high above the ground; migratory; tend to return to prior year's nesting site; will renest if a season's first nest fails; tend to nest in colonies.

Diet: flying insects.

Life cycle: three to four eggs (white with small, dark brown spots) laid (one per day) in April or May and hatch 15-16 days later; fledging occurs 20-25 days after hatching; one to two broods per year.

Other: droppings can be a nuisance over doorways.

Owls (order Strigiformes)

Recent owls (family Strigidae)

Burrowing owl (*Athene cunicularia hybugaea*)

Appearance: round head; no ear tufts; white eyebrows and yellow eyes; long legs; sandy coloured on the head, back, and upper parts of the wings and white-to-cream with barring on the breast and belly and a prominent white chin stripe; 8½-11" long with a 20-24" wing span; weighs 6-7½ ounces.
(Both images taken from The Owl Pages.)

Habits: usually nocturnal but frequently seen during the day; nest in underground burrows, either previously dug by other animals or man-made; call can be "who-who", "rasp", "chuck", "chatter", and "scream"; prefer open, dry grasslands, agricultural and range lands, and desert but can also inhabit grass, forb, and shrub stages of pinyon and ponderosa pine habitats; may or may not migrate in winter; drop litter and animal feces by burrow entrance to repel intruders.

Diet: beetles, grasshoppers, mice, rats, ground squirrels, reptiles, amphibians, scorpions, young cottontail rabbits, bats, and small birds; they also eat fruits and seeds of Prickly Pear cacti.

Life cycle: nesting begins in March or April; six to nine (sometimes up to 12) white eggs are laid a day apart and are incubated for 28-30 days by the female only; care of the young while still in the nest is performed by the male; at 14 days, the young may be seen at the entrance to the burrow, waiting for the adults to return with food; they leave the nest at about 44 days and begin chasing living insects when 49-56 days old; life span is nine or ten years.

Other: a protected species; interference with these birds or their nests will be punished according to law; species is native to North and South America.

Doves and pigeons (order Columbiformes)

Doves and pigeons (family Columbidae)

Western mourning dove (*Zenaida macroura marginella*)

Appearance: taupe to gray top and taupe or off-white belly with white wingtips; slender body and neck. (Image taken from the International Dove Society.)

Habits: monogamous, possibly even through the winter; prefer farms, small towns, open wood, scrub, roadsides, and grasslands; drink by immersing the bill and sucking (uncommon in birds); non-migratory in Las Cruces; male constructs nest on ground or in shrubs or trees.

Diet: seeds, grain, fruit, and insects.

Life cycle: both male and female share incubating two small, white eggs and the feeding of the babies; incubation takes two weeks; fledging occurs two weeks after hatching; five to six generations possible per year; average life span is one to two years.

Other: species is the longest breeding and the leading game bird of all North American birds.

Pigeon, rock dove (*Columba livia*)

Appearance: multi-colored, often dark with light gray or white banding on wings and tail; sometimes iridescent green or purple feathers on head and neck; robust body and neck; bill is dark grayish-pink. (Image taken from Sociedad Albacetense de Ornitología.)

Habits: usually found in urban areas with ample available food; mate for life; male builds nest; bob head while walking; diurnal; tend to nest socially on buildings (which simulate natural cliffs).

Diet: grains and seeds; sometimes scavenges human foods.

Life cycle: both male and female incubate eggs, which usually takes 19 days until hatching.

Other: native to Europe, Africa, and Asia; capable of transmitting disease through droppings.

Cuckoos (order Cuculiformes)

Cuckoos and allies (family Cuculidae)

Roadrunner (*Geococcyx californianus*

Appearance: 20-24" long and 10-12" tall; speckled dark brown and white body; distinctive head crest of blue and black; blue ring around eye and white patch behind eye; long, white-tipped tail pointing up; feet have two forward and two backward toes; males more colorful than females. (Image taken from Fåglar, Frimärken, & Vykort.)

Habits: makes a series of 6 to 8, low, dovelike coos dropping in pitch, as well as a clattering sound; inhabits open, flat or rolling terrain with scattered cover of dry brush, chaparral, or other desert scrub; rarely flies but will occasionally be seen on buildings or walls.

Diet: lizards, snakes, and insects.

Life cycle: mating occurs in spring; female lays from 2-12 eggs; incubation lasts 18-20 days; maturity reached in three years; life span is seven or eight years.

Other: New Mexico's state bird; can run up to 17 miles per hour.

Hawks, eagles, vultures, and falcons (order Falconiformes)

Vultures (family Canthartidae)

Turkey vulture (*Cathartes aura*)

Michigan.)

Appearance: red head and neck feathers, with the exception of a thin layer of down; wingspan of an adult is six feet and; feathers are nearly black, patterned with silvery lining; head is comparatively small, and body is relatively huge. (Both images taken from Animal Diversity Web, University of

Habits: ability to locate food and then communicate the discovery to other individuals over fairly long-range distances accurately; returns to summer feeding grounds precisely upon the vernal equinox; migratory; prefers areas of deciduous woodland, farmland, or other open areas that can be easily scavenged; grunts and hisses when disturbed; diurnal.

Diet: carrion, carcasses, rotting meat.

Life cycle: nesting occurs in summer on the ground or in caves; two eggs laid.

Other: wings form a wide "V" when in flight; feet are adapted to running on the ground, not grasping prey like other birds of this order; save energy by soaring, using upcurrents of air to stay aloft; also save energy by lowering body temperature (torpor) at night and then basking while perched (with wings outstretched) to warm back up in the morning; to cool themselves down when too hot, they urinate on their unfeathered, blood vessel-filled legs, allowing for evaporative cooling but staining their legs white; native to North and South America.

Hawks and eagles (family Accipitridae)

Red-tailed hawk (*Buteo jamaicensis*)

Appearance: 19-24 inches long with 48 inch wingspan; females are 25% larger than the males; plumage ranges from light auburn to deep brown; belly is distinctly lighter than the rest of the body, with a dark band across it; the soft skin at the base of the beak, the legs, and the feet are all yellow; eye color changes from yellowish gray when immature to dark brown in adults. (Both images taken from North American Birds Photo Gallery.)

Habits: monogamous, finding a new mate only when the previous one dies; nests are 28-38 inches in diameter and up to three feet tall; nests are placed 15-75 feet above the ground at the edge of a forest, in wooded fence rows, or in large trees surrounded by open areas and can be used year after year; territories range from half a square mile to over 2 square miles; migratory; typical voice is a hoarse, rasping, medium-pitched scream; emit a harsh "tseer" sound when disturbed; diurnal.

Diet: small rodents, reptiles, and other birds.

Life cycle: one to five eggs laid in spring and incubated for 30 days by both parents; if the first clutch is destoyed, a replacement clutch might be laid within 3 or 4 weeks; males bring food to the female while on the nest; hatching occurs at intervals of one to two days; fledging occurs about 45 days; maturity reached at three years; lifespan estimated at 20 years.

Other: native to North America; very susceptable to albinoism; often use powerlines as perches; sign of good luck in the Mescalero Apache tradition; members of the genus *Buteo* are called "hawks" in North America and "buzzards" in the Old World.

Swainson's Hawk (*Buteo swainsoni*)

Appearance: coloring varies between light form, with white patches on the forehead, the throat and the belly while the body is dark brown, and the dark form, which is the less common type, with an entirely dark brown body with its only white patch under the tail; 19 to 22 inches long, with a wingspan of 47 to 57 inches. (Left image taken from Hawk Stock Photography. Right image taken from Animal Diversity Web, University of Michigan.)

Habits: migratory; nests usually found in trees, shrubs, on the ground, or on top of utility poles; prefers open grasslands and desert-like habitats; diurnal.

Diet: insects, small mammals, birds, reptiles, and amphibians.

Life cycle: nesting occurs in spring; four whitish-colored eggs with brown flecks incubated by both the male and female for 30 days; fledging occurs 30 days later.

Other: this species of hawk is on the list of Federal Species of Concern.

North American golden eagle (*Aquila chrysaetos canadensis*)

Appearance: adults evenly black above and below, sometimes with white at the base of the tail; crown and neck tipped and edged golden buff or tawny; bill and claws black; wingspread 6½-7½ feet; length 30-40 inches; legs are completely feathered, right down to the feet. (Image taken from Society for Research of the Golden Eagle.)

Habits: migratory; build nests on rocky cliffs, mountain crags, and upper branches of tall trees; diurnal.

Diet: small mammals, small birds, sometimes carrion.

Life cycle: breeding occurs in spring; incubation of two eggs lasts 35-45 days, usually by female; both parents feed young with female contributing more as young approach fledging stage; able to fly at about 65-70 days; one clutch per year; maturity reached at four years.

Other: federally protected under the Bald Eagle Protection Act of 1962; native to North America (all other subspecies endemic to Europe and Asia); used for religious purposes in the Zuni Pueblo.

Falcons (family Falconidae)

American peregrine falcon (*Falco peregrinus anatum*)

Appearance: adult is slate gray; wing, tail feathers, and flanks are barred with black; black "moustache" marks exist on the side of the face; throat is white; lower part of the body is white and reddish buffy, extensively spotted and barred with black; legs and feet are yellow; immature birds are brown above, streaked below; 15-21 inches long with 40 inch wingspan. (Image taken from Warnell School of Forest Resources, University of Georgia.)

Habits: diurnal; nesting occurs on cliffs or tall buildings, rarely in trees.

Diet: small birds.

Life cycle: three to four (rarely six or seven) eggs laid in spring; in the event the first clutch was lost early in the season, a second clutch is laid; incubation lasts about 33 days, with a two day hatching interval between eggs; female does most of the incubating while the male hunts; young stay in the nest for six to seven weeks and are not self-sufficient for several months; maturity reached in three years; *peregrinus* is Latin for "foreigner" or "traveler".

Other: no longer a federally endangered species; "falcon" comes from the Latin word "falx" which means "sickle", referring to the shape of the talons and beak.

Prairie falcon (*Falco mexicanus*)

Appearance: 14-18 inches long; wingspan 36-44 inches; sandy brown above with tawny margins and incomplete barring; head with whitish line over eye and dark brown "mustache" streak; pale band across back of neck; throat white; underparts streaked with dark brown; female slightly larger than male. (Image taken from the Hawk Conservancy.)

Habits: diurnal; occur in arid and semiarid shrubland and grassland community types, occasionally in open parklands within coniferous forests; semi-migratory; generally nest on cliffs with a sheltered, gravelly ledge, from low rock outcrops of 30 feet to vertical cliffs 400 feet (121 m) high; voice is a sharp `kik, kik, kik'.

Diet: mammals, birds, reptiles, and insects.

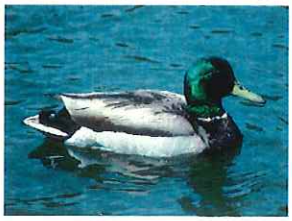
Life cycle: courtship and mate selection occur on the breeding grounds in late winter or early spring, at least one month before laying three to six eggs, which are incubated for 29 to 33 days; if the first clutch is destroyed, another may be laid after 20 to 25 days; nestlings fledge in 40 days; may live as long as 20 years; average life expectancy has been estimated at 2.4 years.

Other: native to North America; "falcon" comes from the Latin word "falx" which means "sickle", referring to the shape of the talons and beak.

Waterfowl (order Anseriformes)

Ducks, geese, and swans (family Anatidae)

Mallard (*Anas platyrhynchos*)




Appearance: iridescent blue wing feathers in both sexes; curled, black feathers on the tail; females mottled light and dark brown with white on tail and a stripe at the eye; males have grayish top, brownish chest, iridescent green plumage on head, and a white neck ring; bills of both mottled orange and black; 18-27 inches long; legs and feet are orange; ducklings have yellow and brown down with a stripe at the eye. (Both images taken from Animal Diversity Web, University of Michigan.)

Habits: migratory; when ducklings hatch, the hen leads them to water and does not return to the nest; rarely dive for food; species prefers to nest in tall grass near ponds, but NMSU mallard nests usually are found in the Junipers planted in the raised beds adjacent to the Educational Services Building.

Diet: vegetation, insects, worms, gastropods, arthropods, and occasionally human food.

Life cycle: pair bonding starts as early as October and continues through March; males leave the hen soon after mating occurs; hen lays 9 -13 eggs in a nest on the ground near a body of water; ducklings begin to grow adult feathers after 25 days and are fully feathered after 46 days.

Other: found in Alumni Pond; the order name is derived from the Latin word "anser", meaning "goose"; "duck" comes from the Anglo-Saxon word "duce", which means "diver"; this species is used for religious purposes in Zuni Pueblo.

Pekin duck (*Anas platyrhynchos domesticus*)


Appearance: adults pure white, with orange-yellow bills and feet; ducklings have yellow feathers. (Image of adult taken from Barry Koffler's FeatherSite. Image of duckling taken from Chicken Cam.)

Habits:

Diet:

Life cycle:

Other: found in Alumni Pond; the order name is derived from the Latin word "anser", meaning "goose"; "duck" comes from the Anglo-Saxon word "duce", which means "diver"; this subspecies was bred from the mallard in China for use as food or a pet and was introduced to the U.S.A. in 1873.

Khaki Campbell duck (*Anas platyrhynchos domesticus*)

Appearance: white body with light brown patches on head, neck, and wings (although there can be tremendous color variation from fully dark to pure white).
(Image of adults taken from Kintaline Farm Poultry and Waterfowl Centre. Image of ducklings taken from The Duck Site.)

Habits:

Diet: slugs, snails, insects, algae, and mosquitoes.

Life cycle: one female can lay up to 340 white eggs (about 2.5 ounces each) in a single year.

Other: found in Alumni Pond; the order name is derived from the Latin word "anser", meaning "goose"; "duck" comes from the Anglo-Saxon word "duce", which means "diver"; bred in Britain around 1900 by Mrs. Adele Campbell; do not require swimming water to stay healthy.

Mammals (kingdom Animalia, phylum Chordata, class Mammalia)

Rodents (order Rodentia)

Rats and mice (family Muridae)

House mouse (*Mus musculus*)

Appearance: small and slender; three to four inches long, plus a two to three inch tail; large ears; small eyes; pointed nose; light brown or gray above with a white belly. (Image taken from Konrad Disinfestazioni e Derattizzazioni.)

Habits: nests within structures, generally 10-30' from food sources; inquisitive but wary; excellent at climbing; usually nocturnal.

Diet: omnivorous but prefers grains and vegetable matter; insects and meat be eaten when available; in human habitations, will eat any human food that is accessible, as well as glue, soap, and other household materials.

Life cycle: can breed at two months; produce litters of four to seven young as often as every 40-50 days; live up to one year.

Other: droppings are rod-shaped; feed 15-20 times per day; can squeeze through ¼" wide holes; carries many serious diseases.

Norway rat (*Rattus norvegicus*)

Appearance: brown; heavy-bodied; six to eight inches long, plus a five to seven inch tail; has small eyes and ears and a blunt nose; tail is shorter than head and body; fur is shaggy. (Image taken from The Research Laboratory for Vector-borne Diseases.)

Habits: nest underground; enter buildings in search of food; primarily nocturnal; acute hearing and smell; poor vision.

Diet: omnivorous but prefers meat; cannot survive for long without water.

Life cycle: reaches sexual maturity in two months; breeds and produces four to seven litters throughout the year; gestation period is just over three weeks; litters usually have eight to twelve young; life span is 2-3½ years.

Other: droppings are capsule-shaped; most common rat in the U.S.A.; limited agility but excellent at swimming; carries many serious diseases; this is the species utilized as lab rats; will bite without warning, but not repeatedly.

Roof rat (*Rattus rattus*).

Appearance: black or brown on top, light gray or light brown underneath; seven to ten inches long, plus a five to seven inch tail; long tail; pointed nose; large ears and eyes; smaller and sleeker than Norway rat; fur is smooth. (Image taken from Il Disinfestatore Professionale.)

Habits: nests inside or under buildings or rubbish piles; excellent at climbing; often found in upper reaches of structures; food may be carried back to the nest and stored; nocturnal; sometimes nest socially.

Diet: omnivorous but prefers grains, fruit, nuts, and vegetables; also eats insects, soap, paper, and beeswax.

Life cycle: reaches sexual maturity in four months; produces four to six litters (of four to eight young per litter) per year; live up to one year.

Other: very agile; can fit through openings as narrow as ½"; carries many serious diseases.

Muskrat (*Ondatra zibethicus*)

Appearance: robust bodies about 12½ inches long; tail is flat, scaly, and 9½ inches long; heads very large; ears almost invisible underneath the fur; whiskers medium size; short legs and big feet; back feet slightly webbed for swimming; adult coloring is glossy, dark brown, darker in winter and paler in summer. (Image taken from Chihuahuan Desert Home Page.)

Habits: live in swamps, marshes, and wetlands, favoring locations with four to six feet of water; diurnal, most active from mid-afternoon until just after dusk; can stay underwater for 12-17 minutes; move relatively slowly on land; communicate by musk, which also is used as a warning for intruders; capable of vocalizing by squeaks and squeals.

Diet: omnivorous but preferring aquatic plant roots.

Life cycle: can breed year round; gestation period is 29-30 days; litter size averages around six; young are able to swim at 10 days and can eat green vegetation by three weeks; in 30 days, muskrats gain their independence; reach adult size in 200 days.

Other: a family lives in Aggie Pond; native to North America; dense fur traps air underneath for insulation and buoyancy; poorly developed senses of sight, hearing, and smell; meat from a muskrat is suitable for human consumption; *Ondatra* is the original Iroquois name; *zibethicus* is Latin for "musky odored".

Squirrels (family Sciuridae)

Spotted ground squirrel (*Spermophilus spilosoma*)

Appearance: light brown or tan with scattered, squarish white spots on back and lighter underbelly; tail might be tipped with black; 7¼-10" long; small ears; high potential for color variation within species. (Image taken from Sevilleta Long-Term Ecological Research Project.)

Habits: prefers open grasslands and deserts; found on the less populated parts of campus; live in underground burrows two to three inches in diameter and 15-20 feet long; burrows have two entrances; opening to burrow is usually under bushes or overhanging rocks; most active in early morning and late afternoon to avoid the midday heat.

Diet: ornamental plants, seeds, irrigation tubing (possibly for its cool water content), and electric wire insulation.

Life cycle: hibernate from September/October to March/April.

Other: native to the western U.S.A. and north central Mexico.

Bats (order Chiroptera)

Small-eared bats (families Phyllostomidae, Molossidae, Vespertilionidae, Mormoopidae)

New Mexican bats (*Myotis* spp., *Lasiurus* spp., *Eumops* spp., *Nyctinomops* spp.)

Appearance: wings can be considered arms with membranes stretched between the fingers; bodies are furry; sharp, curved claws on feet. (Images taken from The Tree of Life.)

Habits: nocturnal; roost in dark, secluded areas; may become trapped and disoriented in occupied areas of buildings; sense objects and distances via echolocation (sonar), usually at a higher frequency than those audible to the human ear; hibernate in winter.

Diet: insects, pollen, nectar, or fruit; none of the species native to New Mexico eats blood.

Life cycle: migratory bats mate in the spring; hibernating bats mate in the fall; gestation lasts 50-90 days, and "pups" are born singly in May or June; occasionally twins occur; pups fly at three to six weeks of age; most bats live 10-20 years.

Other: bites may transmit rabies or histoplasmosis; guano is messy but an excellent fertilizer; some species hibernate while others migrate; bats can enter openings as small as ¼" diameter; the only mammal capable of unassisted flight; not blind as commonly supposed.

Carnivores (order Carnivora)

Cats (family Felidae)

Feral housecats (*Felis sylvestris catus*)

Appearance: various colors; usually weigh 8-15 pounds. (Image taken from Catalunya En-Línia - Hiperencilopèdia.)

Habits: primarily nocturnal.

Diet: scavenger of birds, rodents, or discarded foods.

Life cycle: from one to eight young per litter; lives 13-15 years.

Other: are either former pets or their offspring; capable of transmitting rabies.

Skunks (family Mustelidae) – Refer to NMSU Cooperative Extension Service Guide L-204 for more detailed information about skunks.

Striped skunk (*Mephitis mephitis*)

Appearance: black with one to three white stripes on its back, joining at the shoulders and head; narrow stripe on nose; about the size of a house cat (3½-10 lbs., 20-30" long); males are larger than females; amber eyes. (Image taken from Animals of B.C.)

Habits: nocturnal; will spray a foul musk when threatened; crawl spaces, raised porches, hollow logs, or underground dens; feeding range is ½-2 miles; does not hibernate.

Diet: omnivorous, but primarily insects and grubs and sometimes small rodents and birds' eggs.

Life cycle: mate in February or March; gestation lasts 7-10 weeks, lasting until May or June; litters can contain two to sixteen young (kits) but average four to six; kits can spray musk starting two to four weeks after birth; lifespan is three years.

Other: digging for food can damage turf; nesting in buildings usually is intolerable for humans; capable of carrying rabies. The genus was named after a Roman goddess who was particularly worshipped in regions with volcanoes or solfataras (volcanic vents emitting hot gases and vapors). She was called upon to protect against damages and poisonous gases).

Western spotted skunk (*Spilogale gracilis*)

Appearance: black with white spots on its back; white cheeks; white stripe from nose to back of head; 13-25 lbs.; 22-28" long. (Image taken from Chihuahuan Desert Home Page.)

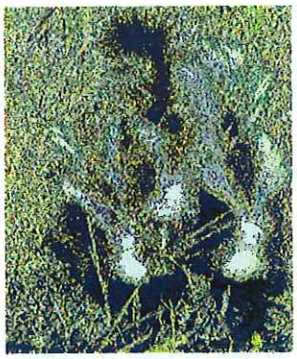
Habits: nocturnal; will spray a foul musk when threatened; crawl spaces, raised porches, hollow logs, or underground dens; feeding range is ½-2 miles.

Diet: omnivorous, but primarily insects and grubs and sometimes small rodents and birds' eggs.

Life cycle: mate in February or March; gestation lasts 7-10 weeks, lasting until May or June; litters can contain two to sixteen young (kits) but average four to six; kits can spray musk starting two to four weeks after birth; lifespan is three years.

Other: digging for food can damage turf; nesting in buildings usually is intolerable for humans; capable of carrying rabies; can climb trees but rarely does so.

Western hognose skunk (*Conepatus mesoleucus*)



Appearance: top of head, back, and tail white; lower body black; 20-35" long; males larger than females. (Image taken from RoKiu Animal Farm.)

Habits: nocturnal; will spray a foul musk when threatened; crawl spaces, raised porches, hollow logs, or underground dens; feeding range is ½-2 miles.

Diet: omnivorous, but primarily insects and grubs and sometimes small rodents.

Life cycle: mate in February or March; gestation lasts 7-10 weeks, lasting until May or June; litters can contain two to sixteen young (kits) but average four to six; kits can spray musk starting two to four weeks after birth; lifespan is three years.

Other: digging for food can damage turf; nesting in buildings usually is intolerable for humans; capable of carrying rabies.

Hooded skunk *(Mephitis macroura)*

Appearance: black with white stripes on its back; about the size of a house cat (3½-10 lbs., 20-30" long). (Image taken from Ecología y Conservación de la Comunidad de Carnívoros del Bosque Tropical Deciduo en el Occidente de México.)

Habits: nocturnal; will spray a foul musk when threatened; crawl spaces, raised porches, hollow logs, or underground dens; feeding range is ½-2 miles.

Diet: omnivorous, but primarily insects and grubs and sometimes small rodents.

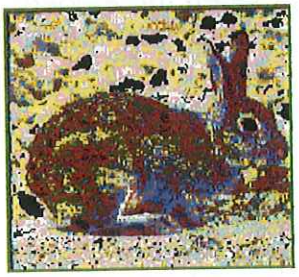
Life cycle: mate in February or March; gestation lasts 7-10 weeks, lasting until May or June; litters can contain two to sixteen young (kits) but average four to six; kits can spray musk starting two to four weeks after birth; lifespan is three years.

Other: digging for food can damage turf; nesting in buildings usually is intolerable for humans; capable of carrying rabies. The genus was named after a Roman goddess who was particularly worshipped in regions with volcanoes or solfataras (volcanic vents emitting hot gases and vapors). She was called upon to protect against damages and poisonous gases).

Rabbits, hares, and pikas (order Lagomorpha)

Rabbits and hares (family Leporidae)

Desert cottontail rabbit (*Sylvilagus audubonii*)



Appearance: medium-long ears (three to four inches long); hind feet relatively slender; dark, buffy brown, heavily lined with black; nape bright and rusty, almost orange rufous; front and outside of forelegs dark ochraceous buff; hind legs brownish cinnamon; underside of neck brownish buff; rest of underparts and under-surface of tail clear white; black whiskers; 13¾-16½ inches long. (Image taken from Asociación Mexicana para la Conservación y Estudio de los Lagomorfos.)

Habits: range size about eight acres; most active in the early morning and in the evening, spending much of the remainder of the day under cover; when startled, it will freeze or run for cover, in a zig-zag pattern, at about 15 miles per hour; able to swim and to climb trees and brush piles; found in arid grasslands and woodlands.

Diet: grasses, mesquite, and cactus.

Life cycle: breed in spring and summer; gestation lasts 28 days; three young per litter, five litters per year; eyes of young open by day ten, and they leave the nest at two weeks, remaining near the nest for another three weeks; maturity is achieved by the age of three months; life span is two years or less.

Other: native to North America; meat is edible; young of true rabbits are born with closed eyes and without fur, while hare young have fur and open eyes at birth.

Black-tailed hare, jackrabbit (*Lepus californicus*)

Appearance: grayish or light brown rabbit with extremely long (six to seven inches long), black-tipped ears; tail is black on the upper side and white beneath; legs are long, flexible, and springlike; 18-25 inches long. (Image taken from Asociación Mexicana para la Conservación y Estudio de los Lagomorfos.)

Habits: can spring 20 feet at a bound and reach top speeds of 30-35 mph over a zig-zag course; do not generally occupy burrows, rather they dig shallow depressions in the earth in which to lie; inactive during the hot afternoon hours and are mainly nocturnal, resting under bushes by day; favor arid short grass range and scrublands; thump the ground with their big hind feet to signal danger.

Diet: grasses, mesquite, cacti, acacia, yucca, and snakeweed.

Life cycle: three or four litters produced from late winter through summer; up to six young born after 41-47 day gestation period; nursing occurs for just two to three days; maturity reached at seven months; lifespan in captivity is 5-6 years, but rabbits in the wild often die much sooner.

Other: native to North America; meat is edible; early settlers of the Southwest noted the animal's extraordinarily long ears and dubbed it "jackass rabbit", which was shortened to "jackrabbit"; young of true rabbits are born with closed eyes and without fur, while hare young have fur and open eyes at birth.

Other animals (kingdom Animalia)

Arthropods (phylum Arthropoda)

Centipede (class Chilopoda; orders Order Geophilomorpha, Scolopendromorpha, Lithobiomorpha, Scutigeromorpha)

Appearance: flattened; one pair of legs for nearly each of 10-100 segments; 1-12" long; various colors; long antennae. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: usually outdoors, under damp leaves, stones, or boards; may enter moist basements, damp closets, or bathrooms; run quickly when disturbed; generally nocturnal.

Diet: insects, decaying organic matter, and spiders.

Life cycle: some species can survive five to six years.

Other: large jaws inject a mild venom, comparable to a wasp sting; not life-threatening.

Millipede (class Diplopoda; orders Polyxenida, Glomerida, Polyzoniida, Platydesmida, Siphonophorida, Callipodida, Chordeumatida, Polydesmida, Spirobolida, Spirostreptida, Julida)

Appearance: rounded body; hard-shelled; 1-3" long; short antennae; two pairs of legs on each of 30-200 segments. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: attracted to lights; do not bite or sting

Diet: decaying vegetation and roots in damp soil.

Life cycle: up to 300 eggs laid in the spring; eggs hatch in three weeks; young molt several times before maturity, adding legs and segments each time; adults can live over two years.

Other:

Pillbugs/roly-polys, sowbugs, woodlice (class Crustacea, order Isopoda)

Appearance: ¼-½" long; gray, brown, or black; hard shell separated into five to seven segments; sowbugs and woodlice have tails. (Image taken from Hydrex Pest Control of the North Bay.)

Habits: pillbugs roll up when disturbed; hide in moist soils under rocks, logs, or debris.

Diet: dead organic matter.

Life cycle: eggs develop in a brood pouch filled with fluid, from which fully developed young are released; each female produces one or two broods.

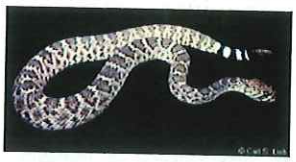
Other: ironically, when the food supply is short, the offspring grow larger; many species native to Europe.

Reptiles (phylum Chordata, class Reptilia, order Squamata)

Snakes (suborder Serpentes)

Pit vipers (family Viperidae)

Western Diamondback Rattlesnake (*Crotalus atrox*)



Appearance: pits on face, just below nostrils; triangular head; three to seven feet long; plump body; short tail; color is yellowish gray, pale blue, or pinkish brown; diamond shapes down its length are dark with pale white borders; tail is white with jet-black rings; head markings include a pale oblique band from nostril to upper labials and a similar but narrower band behind the eye; eyes are lidless and protected by outer skin layer; tongue is forked. (Image taken from Chihuahuan Desert Home Page.)

Habits: often nocturnal to avoid temperature extremes; senses prey with tongue and facial pits; hibernates communally underground in winter; rattles 40-60 times per second; threat posture is slightly flattened body, rolled into a spiral, with the forebody lifted from the ground into an S-shape, and tail raised rattling; found in dry, rocky, shrub-covered terrain.

Diet: rodents, insects, eggs, and young birds; sometimes other reptiles and amphibians.

Life cycle: mating occurs in spring; live young are born in fall, five to twelve per female; maturity reached in three years.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones); rattlesnakes are deaf; *Crotalus* comes from the Greek "crotalon", meaning a rattle or little bell.

Banded Rock Rattlesnake (*Crotalus lepidus klauberi*)

Appearance: pits on face, just below nostrils; triangular head; generally gray with pink, brown, or tan; belly is pink or gray; males are larger and more greenish than females; can be 24-30" long but rarely exceeds two feet in length. (Image taken from Southeastern Hot Herp Society.)

Habits: primarily nocturnal to avoid temperature extremes; sense prey with tongues and facial pits; hibernate underground in winter; may be found in pine-oak forest, but mostly inhabits mountains with rugged, rocky terrain.

Diet: lizards, snakes, and small mammals.

Life cycle: mate in summer; each female gives birth to two to eight live young in spring; babies are up to eight inches long.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones); rattlesnakes are deaf; *Crotalus* comes from the Greek "crotalon", meaning a rattle or little bell; Laurence Klauber was an American authority on rattlesnakes.

Northern Blacktail rattlesnake (*Crotalus molossus molossus*)

Appearance: pits on face, just below nostrils; triangular head; green or olive colored, cream or gray colored, or bright lemon yellow with sharp black contrasts; all-black tail; 36-40" long, sometimes up to four feet. (Image taken from Southeastern Hot Herp Society.)

Habits: avoid temperature extremes; sense prey with tongues and facial pits; hibernate underground in winter; may gape their mouths as the Cottonmouth does when disturbed; found in pine-oak forests, grasslands, and desert.

Diet: rodents, insects, eggs, and young birds.

Life cycle: live young are born in fall, five to twelve at a time; newborn snakes are one to two feet long.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones); rattlesnakes are deaf; *Crotalus* comes from the Greek "crotalon", meaning a rattle or little bell.

Mojave rattlesnake (*Crotalus scutulatus scutulatus*)

Appearance: pits on face, just below nostrils; triangular head; rhomboid markings on a brownish-yellow to greenish ground color; white rings on tail nearly twice as wide as black rings; three to four feet long. (Image taken from Chihuahuan Desert Home Page.)

Habits: primarily nocturnal to avoid temperature extremes; sense prey with tongues and facial pits; hibernate underground in winter; found on lower mountain slopes, grasslands, and scattered scrubby growth; rarely in rocky, hilly terrain.

Diet: small mammals, reptiles.

Life cycle: live young are born in fall, five to twelve at a time; newborn snakes are 9-11 inches long.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones); rattlesnakes are deaf; *Crotalus* comes from the Greek "crotalon", meaning a rattle or little bell.

Prairie rattlesnake (*Crotalus viridis viridis*)

Appearance: pits on face, just below nostrils; triangular head; three to four feet long, rarely to six feet; tan to greenish to dark brown, with darker blotches down the back and smaller spots on the sides; belly is usually light yellow or cream and unmarked, except for darker stippling on some specimens. (Image taken from Instituto del Medio Ambiente y el Desarrollo Sustentable.)

Habits: avoid temperature extremes; sense prey with tongues and facial pits; hibernate underground in winter; found in open grasslands, open desert, rocky hillsides, and ponderosa pine forests.

Diet: rodents, insects, eggs, and young birds.

Life cycle: mating occurs in late summer; live young are born in early autumn, 6-16 at a time; newborn snakes are 7-13 inches long; maturity reached in three years.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones); federally endangered species; rattlesnakes are deaf; *Crotalus* comes from the Greek "crotalon", meaning a rattle or little bell; *viridis* comes from the Latin word for "green".

Western Massasauga (*Sistrurus catenatus tergeminus*)

Appearance: pits on face, just below nostrils; triangular head; row of large or dark brown blotches down the back and three rows of smaller dark spots on each side; belly is light with a few dark markings; typically 1½-2 feet, rarely to three feet. (Image taken from Natural Toxins Research Center, Texas A&M University - Kingsville.)

Habits: avoid temperature extremes; sense prey with tongues and facial pits; hibernate underground in winter; prefer wetlands but will live in grasslands, cultivated areas, and rocky outcroppings.

Diet: rodents, insects, eggs, and young birds.

Life cycle: live young are born in fall, five to twelve at a time; newborn snakes are 7-9½ inches long.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones).

Pygmy Western Massasauga (*Sistrurus catenatus edwardsii*)

Appearance: pits on face, just below nostrils; triangular head. (Image taken from Rattlesnake Pit.)

Habits: avoid temperature extremes; sense prey with tongues and facial pits; hibernate underground in winter; prefer wetlands but will live in grasslands, cultivated areas, and rocky outcroppings.

Diet: rodents, insects, eggs, and young birds.

Life cycle: mate in spring; 5-24 live young are born in fall; newborn snakes are five to seven inches long; mature in three to four years.

Other: will bite humans if disturbed; can bite and inject venom after they are dead; don't always rattle before they strike (especially baby ones).

Colubrid snakes (family Colubridae)

New Mexico milk snake (*Lampropeltis triangulum celaenops*)

Appearance: red, black, and yellowish-white bands (red touches black); head is black with white mottling (sometimes with red); 16-36" long. (Image taken from Kingsnake.com.)

Habits: hibernates underground in winter; nocturnal; prefers rocky grasslands, piñon/juniper mountains, and sandy deserts.

Diet: lizards, small snakes, and mice.

Life cycle: mating occurs in spring; two to nine eggs are laid 30-40 days after mating; 6-10" long young hatch 60 days later; life span is 10-15 years.

Other: resembles coral snake, but in coral snakes red touches yellow (and coral snakes are not endemic to Doña Ana county); scientific name is derived from "lampros" which is Greek for "shining, beautiful" and "pelte" from the Greek meaning "small shield".

Desert kingsnake (*Lampropeltis getula splendida*)

Appearance: three to four feet long, rarely to five feet; black head and body with yellow speckles. (Image taken from Kingsnake.com.)

Habits: nocturnal; prefers to stay near water in grassland flats and mesquite-dominated flats.

Diet: other snakes, lizards, birds, small mammals, and frogs.

Life cycle: mating occurs in spring; eggs laid in summer; seven to ten inch long young hatch in early autumn.

Other: appears to be immune to the venom of native venomous snakes.

Long-nosed snake (*Rhinocheilus lecontei*)

Appearance: slender; cream-color with black patches and red spaces; black spots on white head; very pointed snout; countersunk lower jaw; 2-3½ feet long. (Image taken from Chihuahuan Desert Home Page.)

Habits: kills prey by constriction; nocturnal.

Diet: lizards, rodents, and small snakes.

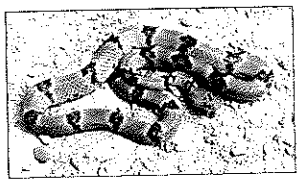
Life cycle: mating occurs in summer; four to nine eggs laid underground; eggs hatch two to three months later, producing eight to ten inch long young.

Other:

Mountain patchnose snake (*Salvadora grahamiae grahamiae*)

Appearance: 20-30" long. (Image taken from Chihuahuan Desert Home Page.)
Habits: diurnal.
Diet:
Life cycle: lays eggs in underground burrow.
Other:

Texas lyre snake (*Trimorphodon biscutatus vilkinsoni*)

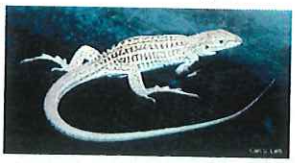


Appearance: three to four feet long; broad head; slender body; light brown with dark brown blotches. (Image taken from Chihuahuan Desert Home Page.)
Habits: nocturnal; prefers hilly, mountainous, and canyon areas dominated by rocks.
Diet: lizards, small mammals.
Life cycle: 6-20 eggs laid; hatching occurs three months later.
Other:

Lizards (suborder Sauria)

Whiptail lizards (family Teiidae)

Chihuahuan spotted whiptail (*Cnemidophorus exsanguis*)



Appearance: up to a foot long; slender with a narrow head; brown or red-brown with six pale yellow or beige stripes from the head to the hips; light colored spots occur on and between the stripes; belly is white or pale blue; grayish-blue or green tail is three times the body length. (Image taken from Chihuahuan Desert Home Page.)

Habits: found in desert grasslands, rocky slopes, or canyon bottoms; diurnal.

Diet: insects.

Life cycle: species is made up of all females; one to six unfertilized eggs are laid in summer; hatchlings appear six weeks later.

Other: like other unisexual members of the genus, the Chihuahuan spotted whiptail was formed from hybridization between two sexually-reproducing *Cnemidophorus*.

New Mexican whiptail (*Cnemidophorus neomexicanus*)

Appearance: 6½-9⅜ inches long; dark brown to black with seven pale yellow stripes and light spots between the stripes; the wavy, mid-dorsal stripe forks at the head; throat is pale blue or blue-green; belly is white or pale blue; tail gray at base, changing to green, blue, or brown, is three times the body length. (Image taken from Chihuahuan Desert Home Page.)

Habits: prefers sandy areas with little vegetation but can be seen in grasslands, shrublands, piñon-juniper wooded uplands, and disturbed areas such as fence rows; diurnal.

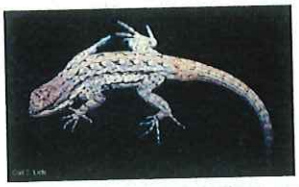
Diet: insects.

Life cycle: species is made up of all females; two to four unfertilized eggs are laid in the summer; hatchlings appear about two months later.

Other: like other unisexual members of the genus, the New Mexican whiptail was formed from hybridization between two sexually-reproducing *Cnemidophorus*.

Other lizards

Tree lizard (*Urosaurus ornatus*, family Iguanidae)



Appearance: 4-6¼ inches; gray to brown with dark blotches and crossbars, some of which may be edged in light blue. (Image taken from Chihuahuan Desert Home Page.)

Habits: arboreal, preferring trees, fallen limbs, rocks, and fence posts; diurnal.

Diet: insects and spiders.

Life cycle: mating occurs in spring or summer; clutches of two to thirteen eggs laid in spring and summer; up to six clutches laid per year.

Other:

Great Plains skink (*Eumeces obsoletus,* family Scincidae)

Appearance: adults, up to a foot long, are brown or black with a gold or light colored dot on each scale, sometimes appearing to be a gold or tan lizard with black dots; the dark dots are sometimes arranged in such a way as to give the appearance of dark stripes; young are 2½ inches at hatching, black with white dots on the lips, head, and neck; tail is bluish. (Image taken from Colorado Herpetological Society.)

Habits: prefers open grasslands with few trees and scattered rocks; diurnal; sometimes burrow under rocks; frequently found in junk or rock piles where there is ample shelter and food.

Diet: insects, spiders, and caterpillars.

Life cycle: emerge from dormancy in late April; mating occurs in spring; 5-32 eggs laid in June and hatch in August; hibernation begins in autumn.

Other: tails can break off for safety and regrow (usually in a different pattern than the rest of the body); native to North America.

Snails and slugs (phylum Mollusca, class Gastropoda)

Snails (order Pulmonata)

Brown garden snail (*Helix aspersa*; family Helicidae)

Appearance: beige or gray, soft, slimy, unsegmented body with medium to dark brown, spirally curled shell, sometimes striped; head has eyes and one to two pairs of tentacles. (Image taken from Garden Safari.)

Habits: moist, shady areas, like the planting area west of Hardman Hall; if stranded in a dry place, the snail withdraws into the shell and seals itself in with a layer of mucus which dries into a rigid cover; extended periods may be spent in hibernation, even stuck to a wall or tree trunk.

Diet: leaves and flowers.

Life cycle: any time a pair of snails meet, mating is possible; over 4-12 hours, each individual injects sperm into the other, fertilizing 50-100 eggs which are laid 3-6 days later in a nest chamber excavated in moist soil; nest is closed and well-concealed; young hatch in about 14 days with a small, fragile shell. Growth continues until maturity at the age of two.

Other: "Gastropoda" means "stomach foot" in Latin; *Helix* is Latin for "twisted" or "wound"; *aspersa* is Latin for "rough"; both male and female at the same time (hermaphroditic); edible (escargot); native to Europe.

Decollate Snail (*Rumina decollata*, family Subulinidae)

Appearance: ¾-1 inch long; black body with dull, olive-gray foot; brown, elongated spiral shell with 4 to 6 whorls, tapering to a blunt end; large individuals have a purple cast at the mouth of the shell. (Image taken from University of California Statewide Integrated Pest Management Project.)

Habits: nocturnal; can tolerate several months without water, going dormant during periods of high temperatures and low relative humidity; hibernate in winter by burrowing underground but will not survive in areas where temperatures remain below freezing for long.

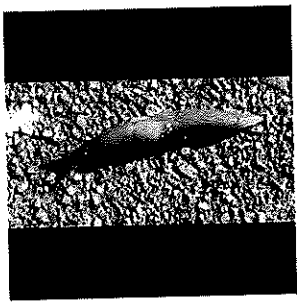
Diet: young brown garden snails (not adults); snail and slug eggs; decomposing plant material.

Life cycle: maturity reached in ten months; adult creates a shallow depression in the soil as a nest and deposits the two mm eggs individually but close enough to form a cluster; 15-50 eggs produced over a period of 3-5 days; 200 eggs laid per year; hatching occurs from ten days to six weeks; lifespan is 1-1½ years.

Other: "Gastropoda" means "stomach foot" in Latin; native to Africa; both male and female at the same time (hermaphroditic).

Slugs (order Stylommatophora)

Garden slugs (family Limacidae)



Appearance: yellowish grey, brown spotted, striped with black, or uniformly dark brown; slimy, unsegmented, soft body; lack shells; head has eyes and one to two pairs of tentacles. (Image taken from Garden Safari.)

Habits: moist, shady areas.

Diet: leaves and flowers.

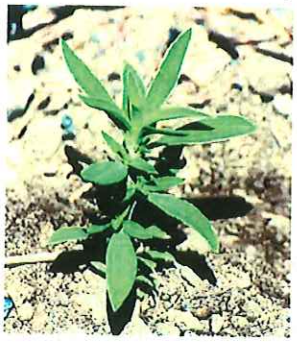
Life cycle: one year until maturity; hibernate in soil.

Other: "Gastropoda" means "stomach foot" in Latin; both male and female at the same time (hermaphroditic); native to Europe.

Weeds (kingdom Plantae)

Warm season annuals

Kochia (*Kochia scoparia*; family Chenopodiaceae)



Appearance: shrublike; one to six feet tall; alternate, medium green, hairy, narrow leaves grayish underneath. (Both images taken from British Columbia Ministry of Agriculture and Food.)

Favorable conditions: disturbed soil.

Other: can be grazed by livestock; once grown as an ornamental; native to Europe; drought tolerant; can produce thousands of seeds.

Russian Thistle, Tumbleweed (*Salsola iberica*; family Chenopodiaceae)

Appearance: shrublike, 18"-6' tall; alternate, dark green, needle-like leaves on stiff stems with red to purple stripes; flowers inconspicuous. (Image taken from Plants of the Verde Valley and Sedona.)

Favorable conditions: disturbed soils.

Other: dries and breaks loose from the ground after seeds are formed; native to Russia; introduced to South Dakota in 1873; seedlings suitable for grazing; can produce thousands of seeds.

Dodder (*Cuscuta* spp.; family Convolvulaceae)

Appearance: yellowish-orange; string-like; leafless; flowers are bell shaped, white to pink, clustered, but usually not conspicuous; flowers appear from early summer to early autumn; fruit is a globular capsule; seeds are gray to brown, oval, and $^{1}/_{25}$-$^{1}/_{16}$" long; mature plants can spread 30'. (Image taken from Pacific Island Ecosystems at Risk.)

Favorable conditions: most broadleaf plants; full sun.

Other: parasititic; reproduces by seed or stem pieces; can grow three inches per day; incapable of photosynthesis; native to North America; seedlings grow on own roots until they reach two to four inches tall and attach to a host.

Morning Glory (*Ipomoea* spp.; family Convolvulaceae)

Appearance: slender, twining, light green stems; medium green leaves heart-shaped (*Ipomoea purpurea*, Tall Morning Glory) or resembling ivy (*Ipomoea nil*, Ivyleaf Morning Glory); flowers can be purple, blue, or white. (Image taken from Flora of Korea.)

Favorable conditions: climbs other plants.

Other: sometimes considered an ornamental; climbs or sprawls to eight feet or more.

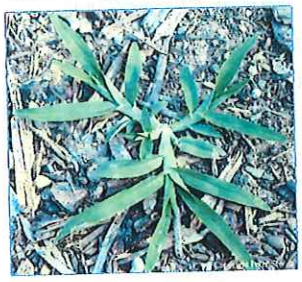
Field sandbur (*Cenchrus incertus* ; family Poaceae)

Appearance: grass; upper surface of medium green leaves is rough; prickly seed heads; overall form can be upright or spreading up to one foot. (Image taken from Institute of Food and Agricultural Sciences, University of Florida.)

Favorable conditions: dry, disturbed soils.

Other: seed heads easily attach to trousers, socks, and shoelaces; *Cenchrus* is from "cenchros", the Greek word for millet.

Goosegrass (*Eleusine indica*; family Poaceae)



Appearance: upright or prostrate; can grow from two inches to two feet, depending on its location and if it is mowed or not; silvery leaf and stem bases; seed heads resemble zippers. (Image taken from Virginia Tech Department of Plant Pathology, Physiology, and Weed Science.)

Favorable conditions: disturbed soil or lawns.

Other: seeds germinate in spring or summer (usually when soil temperature has reached 55°-60°F); one plant can produce thousands of seeds.

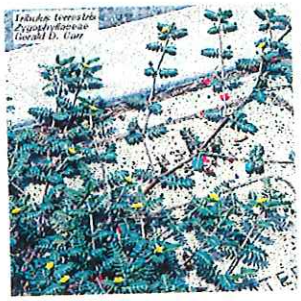
Large Crabgrass (*Digitaria sanguinalis*; family Poaceae)

Appearance: fleshy, hairy stems and leaves are medium green, sometimes reddish; leaves three inches long; flowers on two to five inch stalks; can grow upright or prostrate. (Image taken from Via Rural.)

Favorable conditions: warm temperatures and ample water.

Other: seeds mature in autumn, overwinter, then germinate in spring or summer (usually when soil temperature has reached 55°-60°F).

Puncture Vine, Goathead (*Tribulus terrestris*; family Zygophyllaceae)



Appearance: sharp, spiny seed pods; prostrate form; small, dark green leaflets on tan stems; yellow flowers up to ¼" wide. (Image taken from Pacific Island Ecosystems at Risk.)

Favorable conditions: disturbed soils in full sun.

Other: taproot; native to Europe.

Spotted or Prostrate Spurge (*Chamaesyce maculata*; family Euphorbiaceae)

Appearance: mat-like; many branches; medium to dark green, opposite leaves, each ⅛-½" long and ⅛" wide, usually with a red spot in the leaf center; flowers inconspicuous and pink; usually spreads to one foot but can grow much wider. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: loose soil, unhealthy lawns, or joints in sidewalks.

Other: taproot can reach two feet deep; native to the U.S.; milky sap; one plant can produce thousands of seeds.

Common Purslane (*Portulaca oleracea*; family Portulacaceae)

Appearance: alternate, wedge-shaped, succulent leaves; fleshy, round, reddish stems; prostrate; can spread over one foot; yellow flowers are axillary, not showy. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: moist soil.

Other: can root from pieces; edible; *Portulaca* comes from the Latin word "portare" meaning to carry and "lac meaning "milk" (referring to the milky sap); *oleracea* comes from the Latin word which pertains to kitchen gardens (referring to its use as a vegetable).

Cool season annuals

Annual Bluegrass (*Poa annua*; family Poaceae)

Appearance: six to eight inches tall; seed heads one to four inches long; dark green leaves curve upwards at tips. (Image taken from British Columbia Ministry of Agriculture and Food.)
Favorable conditions: sun to part shade; moist, fertile soil.
Other: grows and matures quickly, several germination flushes per season.

Rescue Grass (*Bromus catharticus*; family Poaceae)

Appearance: can reach three feet tall; medium green; seed heads somewhat open. (Image taken from Via Rural.)
Favorable conditions:
Other:

London Rocket (*Sisymbrium irio*; family Brassicaceae)

Appearance: leaves toothed similar to Dandelion; 12-18" tall; flowers yellow; seed capsules extremely slender. (Image taken from Plants of the Verde Valley and Sedona.)
Favorable conditions: full sun.
Other: drought tolerant.

Black Medic (*Medicago lupulina*; family Leguminosae)

Appearance: three-lobed leaves (resembles White Clover); yellow flowers in small, round clusters; prostrate form. (Image taken from Den Virtuella Floran.)
Favorable conditions: full sun; moderate to high moisture.
Other: native to Europe.

Henbit (*Lamium amplexicaule*; family Lamiaceae)

Appearance: opposite, light green leaves surround square, brittle stem; flowers are lilac-colored and tubular. (Image taken from Virginia Tech Department of Plant Pathology, Physiology, and Weed Science.)

Favorable conditions: full sun; moist soil.

Other:

Simple perennials

Silverleaf Nightshade (*Solanum elaeagnifolium*; family Solanaceae)

Appearance: gray-green, spiny leaves 1½-6" long with undulating edges; flowers are purple with yellow stamens; fruit is yellowish; one to three feet tall. (Image taken from Texas A&M Agricultural Research and Extension Center - Uvalde.)

Favorable conditions: full sun.

Other: poisonous; related to tomatoes; drought tolerant.

Dandelion (*Taraxacum officinale*; family Asteraceae)

Appearance: rosette of deeply toothed, dark green leaves, 2-14" long and ½-3" wide; 6-24" tall stems with golden yellow flowers which turn into white puffballs of seeds. (Image taken from Auburn University.)

Favorable conditions: moist soil; full sun.

Other: native to Europe; pungent aroma when bruised; milky sap; leaves edible; can regrow from as little as a ¼" piece of taproot; "Dandelion" comes from "dent de lion", French for "lion's tooth".

Creeping perennials

Yellow (*Cyperus esculentus*, right) and Purple (*Cyperus rotundus*, left) Nutsedge (family Cyperaceae)

Appearance: resemble grass but have shiny, dark green, triangular stems and leaves; seeds arranged in spiky clusters; up to one foot tall; leaves might be upright or drooping. (Left image taken from Pacific Island Ecosystems at Risk. Right image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: full sun; moderate to high moisture; disturbed soils preferred.

Other: spreads by seeds, tubers ("nutlets"), or rhizomes; tubers are edible; *Cyperus* is from Cypeirus which was the ancient Greek name for the genus; the Latin name *esculentus* means "edible".

Common Bermudagrass (*Cynodon dactylon*; family Poaceae)

Appearance: smooth, medium green leaves, sometimes gray-green; flowering spikes whorled on one stem, similar to Large Crabgrass. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions

Favorable conditions: full sun; moderate water.

Other: spreads by stolons, rhizomes, or seeds; tolerant of foot traffic; will go dormant without water and then green up again with rain or irrigation; native to Africa.

Khakiweed (*Alternanthera pungens*; family Amaranthaceae)

Appearance: ground cover; opposite, dark green, shiny, leaves are not lobed; flowers are rarely noticeable; stems are reddish and hairy. (Image taken from Plant Protection Society of Western Australia.)

Favorable conditions: full sun; moist soil.

Other:

Field Bindweed (*Convolvulus arvensis*; family Convolvulaceae)

Appearance: leaves alternate, arrow-shaped, ½-2" long; resembles Morning Glory; stems flattened with a groove on upper surface; flowers white to pink, broadly trumpet-shaped, 1-1½" wide. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: disturbed soils.

Other: creeping or climbing habit; spreading to ten feet; native to Europe; introduced to U.S. in 1739.

White Clover (*Trifolium repens*; family Leguminosae)

Appearance: medium green, three lobed, finely toothed leaves, sometimes with a white ring passing through the center of the leaflets; white (sometimes pinkish-white) flowers arranged in a globe, to ½" wide. (Left image taken from The Woodrow Wilson National Fellowship Foundation. Right Image taken from Virginia Tech Department of Plant Pathology, Physiology, and Weed Science.)

Favorable conditions: full sun; moist soil.

Other: *Trifolium* means "three-leaved", and *repens* is Latin for "creeping"; flowers attract European honeybees; native to Europe; reproduces by seed or stolon.

Creeping Woodsorrel (*Oxalis corniculata*; family Leguminosae)

Appearance: three-lobed leaves medium green or reddish; leaves close at night; flowers yellow, ⅛-¼" wide; rough, hairy seed pods. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: sun or shade; moist soil.

Other: fleshy taproot; seed pods explode when ripe, propelling tiny, black seeds some distance.

Woody perennials

Siberian Elm (*Ulmus pumila*; family Ulmaceae)

Appearance: deciduous tree to 60 feet tall and 40 feet wide; alternate, deciduous, dark green leaves ¾-1½" long and ½-¾" wide with serrate edges; fruit is light green (drying to tan), ½-¾" wide, round, and papery in the spring. (Image taken from Department of Botany, Iowa State University.)

Favorable conditions:

Other: also known as Chinese Elm; host to Elm Leaf Beetle; fast growing; weak-wooded; resistant to Dutch elm disease; native to Asia.

Mulberry (*Morus alba*; family Moraceae)

Appearance: deciduous, smooth, dark green leaves, five to seven inches long and up to five inches wide, with serrate edges; leaves often lobed in shade or on young plants; fruiting forms have purplish black berries in the spring; height and width average 40 feet. (Image taken from Plants of the Verde Valley and Sedona.)

Favorable conditions: full sun.

Other: fruitless forms produce pollen in the spring; edible fruit (and droppings from birds that eat the fruit) can be messy; native to Asia; *Morus* is the original Latin name; *alba* refers to the fruit, which are white before they mature.

Leafy mistletoe (*Phoradendron macrophyllum*; family Loranthaceae)

Appearance: yellow-green stems and oval, opposite leaves; shrub-like clump can reach two feet in diameter; inconspicuous flowers in summer; white berries produced from October to December. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: broadleaf trees; already-stressed trees are more susceptible.

Other: hemi-parasitic (produces own photosynthetic energy but steals water and minerals from host tree); birds eat fruit and deposit seeds, spreading the infestation; can spread throughout a tree canopy via the tree's vascular system; monoecious; all parts of the plant are poisonous; the common name is based on Anglo-Saxon words for "dung" and "twig", referring to the plant's spread by birds; *Arceuthobium* spp., Dwarf Mistletoe, and other species of *Phoradendron* occur in conifers but have not been observed on campus.

Diseases

Fungi (kingdom Fungi)

Powdery mildew (phylum Ascomycota, order Erysiphales, family Erysiphaceae)

Symptoms: white, powder-like coating on leaves, fruits, or stems; leaves might turn yellow. (Image taken from University of California Statewide Integrated Pest Management Project.)

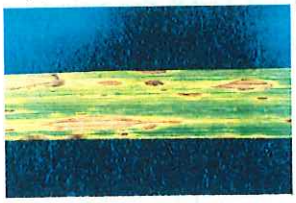
Favorable conditions: moderate to high humidity, low light, and high temperatures (such as dense plantings, shaded parts of the canopy, or damp areas).

Hosts: Common on Japanese Euonymus, Zinnias, and Roses, although most ornamental plants and even turfgrasses are susceptible.

Life cycle: spores germinate then spread over plant surfaces by mycelium; spores are wind-carried.

Other: Unlike other fungi, powdery mildew is inhibited by free water; some pathogen species are specific to particular host species.

Leaf spot (*Bipolaris sorokiniana*; phylum Ascomycota, class Hyphomycetes, order Hyphales, family Pleosporaceae)



Symptoms: small purple to black specks enlarging to elliptical spots on leaf blades; as spots enlarge, the area in the center turns tan; eventually, the whole leaf dies. (Image taken from Iowa State University.)

Favorable conditions: cool temperatures (spring or fall) and ample irrigation or rainfall alternating with dry periods; excess nitrogen fertility; short mowing height.

Hosts: cool season turfgrass.

Life cycle: overwinters as spores or mycelium in infected or dead tissue.

Other: formerly classified in the genus *Helminthosporium*

Melting out (*Drechslera poae*; phylum Ascomycota, class Hyphomycota, order Hyphales, family Pleosporaceae)

Symptoms: small purple to black specks on the leaves (similar to leaf spot), progressing to the crown and roots; basal tissues turn dark brown and rot; overall turf appears yellowish and thin with dead patches. (Both images taken from Alberta Agriculture, Food, and Rural Development.)

Favorable conditions: warm temperatures (summer) and ample irrigation or rainfall alternating with dry periods; excess nitrogen fertility; short mowing height.

Hosts: cool season turfgrass.

Life cycle: overwinters as spores or mycelium in infected or dead tissue.

Other: formerly classified in the genus *Helminthosporium*

Anthracnose on turfgrass (*Colletotrichum graminicola*; phylum Deuteromycotina, class Coelomycota, order Melanconiales, family Melanconiaceae)

Symptoms: reddish brown blotches fading to light tan on leaf blades; in patches of turf up to 12" in diameter; black fruiting bodies formed on dead leaf blades. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: under- or over-fertilized turf; warm temperatures (80°-90°F); surface water on leaves.

Hosts: all turfgrasses, especially Annual Bluegrass.

Life cycle:

Other:

Anthracnose on ornamentals (*Diplocarpon* spp., *Elsinoe* spp., *Glomerella* spp., *Gnomonia* spp.)

Symptoms: (Image taken from USDA Forest Service - St. Paul Field Office.)

Favorable conditions:

Hosts: various broadleaf plants

Life cycle:

Other:

Sooty mold (*Limacinia* spp., *Capnodium* spp.; phylum Ascomycota, class Loculoascomycetes, order Dothidiales, family Capnodiaceae)

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Symptoms: grayish-black appearance of leaves. (Both images taken from University of Florida Department of Entomology and Nematology.)

Favorable conditions:

Hosts: honeydew left by piercing-sucking insects.

Life cycle:

Other:

Brown patch (*Rhizoctonia solani*, class Basidiomycota, order Ceratobasidiales, family Ceratobasidiaceae)

Symptoms: a rounded, discolored, unhealthy patch from six inches to 15 feet in diameter, perhaps with a reddish-brown "halo" border. (Image taken from University of California Statewide Integrated Pest Management Project.)

Favorable conditions: excess nitrogen fertility; surface moisture or high humidity; high temperatures.

Hosts: most warm season turfgrass species.

Life cycle:

Other:

Bacteria (kingdom Monera)

Slime flux, wetwood (*Erwinia* spp., *Enterobacter* spp., *Klebsiella* spp., *Pseudomonas* spp.; phylum Eubacteriacea, class Schizomycetes, order Eubacteriales, family Enterobacteriaceae)

Symptoms: dark, watery staining of bark, usually below pruning cuts, wounds, or branch crotches. (Image taken from Colorado State University Cooperative Extension Service Fact Sheet #2.910.)

Favorable conditions:

Hosts: Mulberries, willows, elms, other tree species.

Life cycle:

Other: usually not lethal; sometimes accompanied by an odor, dieback of the branch above the infection, or insects.

Viruses

Viruses can be transmitted by insects or through conjoined root systems of different plants. They are more prevalent on agricultural crops in the Mesilla Valley and do not commonly cause problems with the ornamental species on campus.

woywood/Projects/IPM-Manual/identification.wpd

http://nmdaweb.nmsu.edu/Statutes/AES/PM/pesticid.htm

"THESE ARE NOT OFFICIAL RULES OF THE STATE OF NEW MEXICO UNDER THE PROVISIONS OF 14-4-7.1 AND 14-4-7.2 NMSA 1978. THE NEW MEXICO STATE RECORDS CENTER AND ARCHIVES ADVISES POTENTIAL USERS OF THESE RULES THAT THEY MAY NOT BE CORRECT, COMPLETE, OR CURRENT. FOR AN OFFICIAL COPY OF A NEW MEXICO, RULE CONTACT THE ISSUING AGENCY OR THE NEW MEXICO STATE RECORDS CENTER AND ARCHIVES, STATE RULES DIVISION, 1205 CAMINO CARLOS REY, SANTA FE, NM 87505, (505) 476-7907."

New Mexico Territorial Laws
Chapter 76 Agriculture
Chapter 76, Article 4 Pesticide Control
76-4-1 Title
This act may be cited as the "Pesticide Control Act."
History: 1953 Comp., § 45-25-1, enacted by Laws 1973, ch. 366, § 1.

76-4-2. Enforcing agency.

The Pesticide Control Act shall be administered and enforced by the state department of agriculture, under the direction of the board of regents, New Mexico State University.
History: 1953 Comp., § 45-25-2, enacted by Laws 1973, ch. 366, § 2.

76-4-3. Definitions.

As used in the Pesticide Control Act:

A. "equipment" means any type of ground, water, or aerial equipment, device, or contrivance using motorized, mechanical, or pressurized power to apply any pesticide on land and anything that may be growing, habitating, or stored on or in such land but does not include any pressurized, hand-sized, household device used by a homeowner to apply a pesticide or any equipment, device, or contrivance of which the person who is applying the pesticide on his own land is the source of power or energy in making the pesticide application;

B. "board" means the board of regents of New Mexico State University;

C. "department" means the New Mexico Department of Agriculture;

D. "device" means any instrument or contrivance other than a firearm which is intended for trapping, destroying, repelling, or mitigating any pest or any other form of plant or animal life, other than man and other than bacteria, viruses, or other microorganisms, on or in any living thing other than plants but does not include equipment used for the application of pesticides when sold separately therefrom or traps used to control predators or rodents or sterilization using dry heat or steam;

E. "distribute" means to offer for sale, hold for sale, sell, barter, or supply in this state;

F. "environment" includes water, air, land, all plants, every living thing therein or

thereon, and the existing interrelationships;

G. "insect" means any of the numerous small, invertebrate animals belonging principally to the class Insecta, including but not limited to beetles, bugs, bees, and flies, and to other allied classes of arthropods, including but not limited to spiders, mites, ticks, millipedes, centipedes, and sowbugs;

H. "ingredient statement" means a statement which contains the name and percentage of each ingredient of any pesticide which is intended for one of the purposes under Paragraphs (1) through (4) of Subsection N of this section and the total percentage of all ingredients in the pesticide not for one of those purposes. If the pesticide contains arsenic in any form, the ingredient statement shall contain a statement of the percentages of total and water-soluble arsenic, calculated as elemental arsenic;

I. "label" means the written, printed, or graphic matter on or attached to the pesticide or device or any of its containers or wrappers;

J. "labeling" means all labels and all other written, printed, or graphic matter accompanying the pesticide or device at any time, or to which reference is made on the label or in literature accompanying the pesticide or device, except to current official publications of the department, the United States Environmental Protection Agency, United States Departments of Agriculture, Interior, and Health, Education and Welfare, state agricultural universities, and other similar federal or state institutions or agencies authorized by law to conduct research in the field of pesticides;

K. "land" means all land and water areas, including air space, all living things, and all structures, buildings, contrivances, and machinery appurtenant thereto or situated thereon, fixed or mobile, including any used for transportation;

L. "person" has the extended meaning ascribed to it in Subsection E of Section 12-2-2 NMSA 1978;

M. "pest" means any living organism injurious to other living organisms, except man, viruses, bacteria, or other microorganisms in or on other living organisms other than plants, which the board by regulation declares to be a pest;

N. "pesticide" means any substance or mixture of substances intended for:

(1) preventing, destroying, repelling or mitigating any pest;

(2) causing the leaves or foliage to drop from a plant, with or without causing abscission;

(3) artificially accelerating the drying of plant tissue; or

(4) accelerating or retarding the rate of growth or rate of maturation, or for otherwise altering the behavior of ornamental or crop plants or the produce thereof, through physiological action, but not including substances that are intended as plant nutrients, trace elements, nutritional chemicals, plant inoculants, or soil amendments;

O. "pesticide dealer" means any person who distributes highly toxic pesticides, restricted use pesticides, or both, which pesticides are restricted by regulation to distribution only by licensed pesticide dealers;

P. "pest management consultant" means any individual who offers or supplies technical advice or makes recommendations to the user of highly toxic pesticides, restricted use pesticides, or both, which pesticides are restricted by regulation to distribution only by licensed pesticide dealers;

Q. "registrant" means a person who has registered any pesticide pursuant to

the provisions of the Pesticide Control Act;

R. "restricted use pesticide" means any pesticide or device designated by the board as requiring specific restrictions to prevent unreasonable adverse effects on the environment including man, beneficial insect predators and parasites, pollinating insects, animals, crops, wildlife, and lands, excluding the pests the pesticide or device is intended to prevent, destroy, control, or mitigate;

S. "unreasonable adverse effects on the environment" means an unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide;

T. "noncommercial applicator" means a person who uses or demonstrates restricted use pesticides and does not qualify as a private applicator and is not required to have commercial applicator's license;

U. "private applicator" means a certified applicator who uses or supervises the use of any pesticide which is classified for restricted use for purposes of producing an agricultural commodity on property owned or rented by him or his employer or on the property of another person if applied without compensation other than trading of personal services between producers of agricultural commodities;

V. "public applicator" means a certified applicator who, as an employee of a federal, state, county, or city agency or municipal corporation, uses or supervises the use of any pesticide which is classified for restricted use only by certified applicators or person under their direct supervision;

W. "commercial applicator" means a certified applicator, whether or not he is a private applicator with respect to some users, who, for compensation, uses or supervises the use of any pesticide for any purpose on any property other than as provided by Section 76-4-19 NMSA 1978 and Section 8 [76-4-20.1 NMSA 1978] of this act.

History: 1953 Comp., § 45-25-3, enacted by Laws 1973, ch. 366, § 3; 1979, ch. 394, § 1.

76-4-4. Misbranded.

A pesticide or device is misbranded if:

A. its labeling bears any statement, design, or graphic representation relative thereto or to its ingredients which is false or misleading;

B. it is contained in a package or other container or wrapping which does not conform to the standards established by the board;

C. it is an imitation of or is distributed under the name of another pesticide or device;

D. any word, statement, or other information required by the Pesticide Control Act or regulations adopted thereunder to appear on the label or labeling is not prominently placed thereon with such conspicuousness (as compared with other words, statements, designs, or graphic matter in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use;

E. the labeling accompanying it does not contain directions for use which are necessary for effecting the purpose for which the product was intended and if

complied with, together with any requirements imposed by the Pesticide Control Act and regulations adopted by the board, are adequate to prevent injury to plants and animals including man, and protect against any unreasonable adverse effects on the environment;

F. the labeling bears any reference to registration under the provisions of the Pesticide Control Act unless such reference is required by regulations adopted pursuant to the Pesticide Control Act;

G. the label does not bear:

(1) the name and address of the producer, registrant or person for whom produced;

(2) the name, brand, or trademark under which the pesticide is distributed;

(3) an ingredient statement on that part of the immediate container and on the outside container or wrapper, if there be one through which the ingredient statement on the immediate container cannot be clearly read, of the retail package which is presented or displayed under customary conditions of purchase. However, the department may permit the ingredient statement to appear prominently on some other part of the container, if the size or form of the container makes it impractical to place the ingredient statement on the part which is presented or displayed under customary conditions of purchase;

(4) directions for use and a warning or caution statement which are necessary and which, if complied with, would be adequate for the protection of health and protection against injury to plants and animals including man and protection against any unreasonable adverse effects on the environment;

(5) the net weight or measure of the contents;

(6) the registration number assigned the pesticide and the registration number of the person formulating the pesticide by the United States Environmental Protection Agency;

(7) a statement of the use classification under which the product is registered, if required by federal or state regulations;

H. the pesticide contains any substance or substances in quantities highly toxic to man as determined by the board, unless the label bears, in addition to any other matter required by the Pesticide Control Act:

(1) the skull and crossbones or any other symbol required for registration by the United States Environmental Protection Agency;

(2) the word "POISON" prominently printed in red on a background of distinctly contrasting color;

(3) a statement of an antidote or practical treatment in case of poisoning by the pesticide;

I. the pesticide container does not bear a label, or if the label does not contain all the information required by the Pesticide Control Act and the regulations adopted pursuant to the act, or both;

J. the label for a spray adjuvant fails to state the type or function of the functioning agents;

K. the label is not printed in English and Spanish, as prescribed by the United States Environmental Protection Agency and by regulations of the board.

History: 1953 Comp., § 45-25-4, enacted by Laws 1973, ch. 366, § 4.

76-4-5. Prohibited acts.

A. It is unlawful for any person to distribute within the state, to deliver for transportation or transport in intrastate commerce or between points within this state through any point outside this state, or to use any of the following:

(1) any pesticide which has not been registered in accordance with the Pesticide Control Act or regulations adopted pursuant to that act;

(2) any pesticide if any of the claims made for it or any of the directions for its use or other labeling differs from the representations made in connection with its registration, or if the composition as represented in connection with its registration differs. However, at the discretion of the department, a change in the labeling of a pesticide except changes in the ingredient statement may be made within a registration period without requiring reregistration of the product if the change will not have unreasonable adverse effects on the environment;

(3) any pesticide, unless it is in the unbroken immediate container of the registrant or manufacturer and there is affixed to the container and to the outside container or wrapper of the retail package, if there is one through which the required information on the immediate container cannot be clearly read, a label bearing information required in the Pesticide Control Act and the regulations adopted pursuant to that act;

(4) any pesticide which has not been colored or discolored as required by the Pesticide Control Act;

(5) any pesticide which does not meet the professed standard of quantity or quality, as expressed on the labeling under which it is sold, or in which any substance has been substituted wholly or in part for the pesticide, or if any valuable constituent has been wholly or in part abstracted, or if any contaminated is misbranded or is present in an amount determined by the department to be a hazard;

(6) any device which is misbranded;

(7) any pesticide in containers violating regulations adopted pursuant to the Pesticide Control Act, or pesticides found in damaged containers which constituted a hazard to the environment.

B. It is unlawful:

(1) to distribute a restricted use pesticide to any person who is required by law or regulations promulgated pursuant to the Pesticide Control Act to have a permit to use or purchase restricted use pesticides, unless the person or his agent to whom sale or delivery is made has a valid permit to use or purchase the kind and quantity of the restricted use pesticide. However, subject to conditions established by the department, such permit may be obtained from any person designated by the department immediately prior to distribution;

(2) for any person to detach, alter, deface, or destroy wholly or in part any label or labeling provided for in the Pesticide Control Act or regulations adopted pursuant to that act, or to add any substance to or take any substance from a pesticide in a manner that may defeat the purpose of the Pesticide Control Act or the regulations adopted thereunder;

(3) for any person to use or cause to be used any restricted use pesticide contrary to directions on the label or to regulations of the board if those regulations differ from or further restrict the labeling;

(4) for any person to use for his own advantage or to reveal, other than to the department or to the courts of the state in response to a subpoena or to physicians or in emergencies to pharmacists and other qualified persons for use in the preparation of a practical treatment including first aid in case of poisoning, any information relative to formulas of products acquired by authority of the Pesticide Control Act;

(5) for any person to handle, transport, store, display, distribute, or use pesticides in such a manner as to endanger man and his environment or to endanger food, feed, or any other products that may be transported, stored, displayed, or distributed with such pesticides;

(6) for any person to dispose of, discard, or store any pesticides or pesticide containers in a manner that may cause injury to humans, vegetation, crops, livestock, wildlife, or pollinating insects or may pollute any water supply or waterway.

History: 1953 Comp., § 45-25-5, enacted by Laws 1973, ch. 366, § 5.

76-4-6. Registration.

A. Each pesticide or device that is distributed within the state or delivered for transportation or transported in intrastate commerce or between points within this state through any point outside this state shall be registered with the department subject to the provisions of the Pesticide Control Act. However, the registration is not required if a pesticide is shipped from one plant or warehouse operated by the same person and used solely at such plant or warehouse as a constituent part to make a pesticide which is registered under the provisions of the Pesticide Control Act.

B. The applicant for registration shall file a statement with the board which includes:

(1) the name and address of the applicant and the name and address of the person whose name will appear on the label, if other than the applicant's;

(2) the name of the pesticide or device;

(3) other necessary information required for completion of the application for registration form;

(4) a complete copy of the labeling accompanying the pesticide or device and a statement of all claims including the directions and precautions for use;

(5) the use classification of the pesticide, if required by federal or state regulations.

C. The department, when it deems it necessary in the administration of the Pesticide Control Act, may require the submission of the complete formula of any pesticide, including all ingredients which will prevent, destroy, repel, control, or mitigate pests or which will act as a plant regulator, defoliant, desiccant or those which act as a functioning agent in a spray adjuvant and all ingredients which do not perform these functions.

D. The department may require a full description of the tests made and the results thereof upon which the claims are based on any pesticide or device or on any

pesticide or device on which restrictions are being considered. In the case of renewal of registration, the applicant shall be required to furnish only information which is different from that furnished when the pesticide was registered or reregistered during the previous license year.

E. The board may prescribe other necessary information by regulation.

F. The applicant desiring to register a pesticide or device shall pay an annual prescribed registration fee for each pesticide or device registered.

G. Any registration approved by the department and in effect on December 31 of the year for which a renewal application has been made and the proper fee paid shall continue in full force and effect until the department notifies the applicant that the registration has been renewed or denied in accord with the provisions of the Pesticide Control Act. Forms for reregistration shall be mailed to registrants at least thirty days prior to the due date.

H. If it appears to the department that the composition of the pesticide warrants the proposed claims for it, and if the pesticide or device and its labeling and other material submitted comply with the requirements of the Pesticide Control Act, the department shall register the pesticide or device.

I. All federal, state, and county agencies or municipalities shall register all pesticides or devices distributed by them but shall not be required to pay the registration fee.

History: 1953 comp., § 45-25-6, enacted by Laws 1973, ch. 366, § 6.

76-4-7. Experimental use permits.

A. No person shall conduct field tests using a pesticide not registered with the department or a registered pesticide for a use not previously approved in the registration without first having obtained an experimental use permit from the department.

B. Any person may apply to the department for an experimental use permit for a pesticide. The department may issue an experimental use permit if it determines that the applicant needs the permit in order to accumulate information necessary to register a pesticide. The department may refuse to issue an experimental use permit if it determines that issuance of such permit is not warranted or that the pesticide use to be made under the proposed terms and conditions may cause unreasonable adverse effects on the environment.

C. Use of a pesticide under an experimental use permit shall be under the supervision of the department and shall be subject to the terms and conditions and be for the period of time prescribed by the department in the permit.

D. The department may revoke any experimental use permit at any time, if it finds that the terms or conditions of the permit are being violated or that its terms and conditions are inadequate to avoid unreasonable adverse effects on the environment.

History: 1953 Comp., § 45-25-7, enacted by Laws 1973, ch. 366, § 7; 1979, ch. 394, § 2.

76-4-8. Refusal to register; cancellation; suspension.

A. If it does not appear to the department that the pesticide or device warrants the proposed claims, or if the pesticide or device and its labeling and other required material do not comply with the provisions of the Pesticide Control Act or regulations adopted thereunder, the department shall notify the applicant of the manner in which the pesticide, device, labeling, or other required material fails to comply with the provisions of the Pesticide Control Act and permit the applicant to make the necessary corrections. If, upon receipt of such notice, the applicant does not make the required changes, the department may refuse to register the pesticide or device.

B. The department may, when it determines that a pesticide or device or its labeling does not comply with the provisions of the Pesticide Control Act or the regulations adopted thereunder, cancel the registration of a pesticide or device.

C. The department shall, when it determines that a situation exists in which the continued use of a pesticide during the time required for cancellation under the Pesticide Control Act would likely result in unreasonable adverse effects on the environment, suspend on their own motion the registration or a pesticide or device.

History: 1953 Comp., § 45-25-8, enacted by Laws 1973, ch. 366, § 8.

76-4-9. Department to administer and enforce act; board to adopt regulations; scope of regulations.

The department shall administer and enforce the provisions of the Pesticide Control Act and regulations promulgated by the board.

A. The board may, after notice and public hearing, adopt regulations for carrying out the purpose and provisions of the Pesticide Control Act, including regulations providing for:

(1) declaring as a pest any form of plant or animal life or virus other than man and other than bacteria, viruses, and other microorganisms on or in living man or other living animals, which is injurious to health or the environment;

(2) designating certain pesticides to be highly toxic to any animal, including man;

(3) determining standards for identifying pesticides by color, taste, odor, or form;

(4) the collection and examination of devices or samples of pesticides for analysis;

(5) requiring pesticide applicators to notify land owners of property adjoining the property to be treated or in the immediate vicinity thereof of a proposed application of a pesticide, if such a notice is necessary to carry out the purpose of the Pesticide Control Act; and for a hearing before the director of the department of any objecting owner of property adjoining the property to be treated before the application of the pesticide;

(6) the safe handling, transportation, storage, display, distribution, use and, disposal of pesticides and their containers;

(7) establishing standards with respect to the package, container, or wrapping in which a pesticide is distributed;

(8) restricting or prohibiting the use of certain types of containers or packages for specific pesticides. These restrictions may apply to type of construction,

strength, and size, or any combination thereof, to alleviate danger of spillage, breakage, misuse, or any other hazard to the public;

(9) procedures for making pesticide recommendation;

(10) adopting a list of restricted use pesticides for the state or for designated areas within the state;

(11) regulating the time and conditions of distribution, sale or use of the restricted use pesticides;

(12) requiring all persons issued licenses to offer technical advice, to sell, or to use restricted use pesticides to maintain records as prescribed by the department;

(13) certification of private applicators;

(14) label requirements of all pesticides required to be registered under provisions of the Pesticide Control Act;

(15) regulating the labeling of devices;

(16) procedures and techniques to be used in sampling land, including agricultural products that are to be consumed by man or animals, for pesticide residues;

(17) classifying pesticides for general use, restricted use, or both;

(18) prescribing methods to be used in the application of pesticides where the department finds that such regulations are necessary to carry out the purpose and intent of the Pesticide Control Act. Such regulations may relate to the time, manner, methods, materials, and amounts and concentrations in connection with the application of the pesticides and may restrict or prohibit use of pesticides in designated areas during specified periods of time and shall encompass all reasonable factors which the department deems necessary to prevent damage or injury by drift or misapplication to plants, including forage plants, or adjacent or nearby lands; wildlife in the adjoining or nearby areas; fish and other aquatic life in waters in reasonable proximity to the area to be treated; and humans, animals or beneficial insects. In issuing such regulations, the board shall give consideration to pertinent research findings and recommendations of other agencies of the state, the federal government, or other reliable sources;

(19) requiring any pesticide use dilution to be colored or discolored if it determines that such requirement is feasible and is necessary for the protection of health and the environment;

(20) establishing good pesticide use and handling practices for commercial pesticide applicators;

(21) establishing requirements for supervision of servicemen of structural pest control applicators

(22) regulating false or misleading advertisement in the sales or use of pesticides and devices.

B. The board shall adopt regulations that are consistent with regulations of the New Mexico Environmental Improvement Board, the New Mexico Water Quality Control Commission, and the laws administered by the regulations of the United States Environmental Protection Agency.

C. The department is authorized to specify the quantities and concentrations of restricted use pesticides that may be applied.

History: 1953 Comp., § 45-25-9, enacted by Laws 1973, ch. 366, § 9; 1979, ch. 394, § 3.

76-4-9.1. State preemption.

Except as otherwise authorized in the Pesticide Control Act, no city, county, or other political subdivision of the state and no home rule municipality shall adopt or continue in effect any ordinance, rule, regulation, or statute regarding the registration, labeling, distribution, sale, handling, use, application, transportation, or disposal of pesticides.
History: Laws 1992, ch. 25, § 1.

76-4-10. Sampling and examination of pesticides or devices; residue analysis.

A. The sampling and examination of pesticides or devices shall be made under the direction of the department for the purpose of determining if they comply with the requirements of the Pesticide Control Act.

B. The sampling of land, including agricultural products that are to be consumed by man or animals, may be made by the department to determine if pesticide residues are present that will cause unreasonable adverse effects on the environment or if the residues exceed the tolerance established by the United States Environmental Protection Agency, New Mexico Environmental Improvement Agency [department of environment], or restrictions established by other federal or state regulatory agencies.
History: 1953 Comp., § 45-25-10, enacted by Laws 1973, ch. 366, § 10.

76-4-11. "Stop sale, use or removal" order.

When the department has reasonable cause to believe a pesticide or device is being distributed, used, stored, or transported in violation of any of the provisions of the Pesticide Control Act or regulations adopted pursuant thereto, the department may issue and serve a written "stop sale, use, or removal" order upon the owner or custodian of the pesticide or device. If the owner or custodian is not available to receive the order, the department may attach the order to the pesticide or device and notify the registrant. The pesticide or device shall not be distributed, used, or removed until the provisions of the Pesticide Control Act have been complied with and the pesticide or device has been released in writing under conditions specified by the department or the alleged violation has been otherwise disposed of as provided in the Pesticide Control Act by a court of competent jurisdiction.
History: 1953 Comp., § 45-25-11, enacted by Laws 1973, ch. 366, § 11.

76-4-12. Judicial action after "stop sale, use or removal" order.

A. After service of a "stop sale, use, or removal" order is made upon any person, that person or the registrant or the department may file an action in a court of competent jurisdiction, in the county in which a violation of the Pesticide Control Act or regulations adopted thereunder is alleged to have occurred, for an adjudication of the

alleged violation. The court in such action may issue temporary or permanent injunctions, mandatory or restraining, and such intermediate orders as it deems necessary or advisable. The court may order condemnation of any pesticide or device that does not meet the requirements of the Pesticide Control Act or regulations adopted thereunder.

B. If the pesticide or device is condemned, it shall, after entry of decree, be disposed of by destruction or sale as the court directs. However, the pesticide or device shall not be sold contrary to the provisions of the Pesticide Control Act or regulations adopted thereunder. Upon payment of the costs of the condemnation proceedings and the execution and delivery of a bond as prescribed by the court to assure the pesticide or device shall not be sold or disposed of contrary to the provisions of the Pesticide Control Act or regulations adopted pursuant thereto, the court may direct that the pesticide or device be delivered to the owner thereof for relabeling, reprocessing, or otherwise bringing the product into compliance.

C. When a decree of condemnation is entered against the pesticide or device, court costs, fees, storage, and other proper expenses shall be awarded against the person, if any, appearing as claimant of the pesticide or device.

History: 1953 Comp., § 45-25-12, enacted by Laws 1973, ch. 366, § 12.

76-4-13. Pesticide dealer license.

A. It is unlawful for any person to act in the capacity of a pesticide dealer or advertise as, or assume to act as a pesticide dealer at any time without first having obtained an annual license from the department. A license shall be required for each location or outlet located within this state from which pesticides are distributed. Any manufacturer, registrant, or distributor who has no pesticide dealer outlet licensed within this state and who distributes pesticides directly into this state shall obtain a pesticide dealer license for his principal out-of-state location or outlet.

B. Application for a license shall be accompanied by the prescribed annual license fee and shall be on a form provided by the department. The application shall include:

(1) the full name and title of the person applying for the license;

(2) the address of each outlet to be licensed;

(3) the principal business address of the applicant;

(4) the name of a person domiciled in this state authorized to receive and accept service of summons and legal notices of all kinds for the applicant;

(5) any other necessary information prescribed by the department.

C. Provisions of this section shall not apply to a licensed pesticide applicator who sells pesticides only as an integral part of his pesticide application service when the pesticides are dispensed only through an apparatus used for such pesticide application, or any federal, state or county agency, or municipality which provides pesticides only for its own programs.

D. Each pesticide dealer shall be responsible for the acts of each individual employed by him in the solicitation and sale of pesticides and all claims and recommendations for the use of pesticides. The dealer license shall be subject to denial, suspension, or revocation after a hearing for any violation of the Pesticide

Control Act or regulations adopted thereunder, whether committed by the dealer or by an officer, agent, or employee of the dealer.
History: 1953 Comp., § 45-25-13, enacted by Laws 1973, ch. 366, § 13.

76-4-14. Pest management consultant.

No individual shall perform services as a pest management consultant without first obtaining from the department an annual license. Application for a license shall be on a form provided by the department and shall be accompanied by the prescribed fee. Licensed pesticide applicators and operators and employees of federal, state and county agencies, or municipalities, when acting in their official capacities, shall be exempt from this licensing provision.
History: 1953 Comp., § 45-25-14, enacted by Laws 1973, ch. 366, § 14.

76-4-15. Public pest management consultant.

A "public pest management consultant" means any individual who is employed by a governmental agency or municipality to act as a pest management consultant. No person shall act as a public pest management consultant without first obtaining an annual nonfee license from the department. Application for a license shall be on a form provided by the department. The nonfee license shall be valid only when the consultant is acting in that capacity as an employee of his governmental employer. Federal and state employees whose principal responsibilities are in pesticide research shall be exempt from this licensing provision while acting in their official capacities.
History: 1953 Comp., § 45-25-15, enacted by Laws 1973, ch. 366, § 15.

76-4-16. Examinations for pest management consultant license.

The department shall require each applicant for a pest management consultant license or a public pest management consultant license to demonstrate the applicant's knowledge of pesticide laws and regulations, pesticide hazards, and the safe distribution, use, application, and disposal of pesticides by satisfactorily passing a written examination for the classification for which he has applied, prior to issuing his license. The prescribed examination fee shall be paid for the initial examination and other examinations needed to qualify the applicant to perform services as a pest management consultant. The public pest management consultant shall not be required to pay the examination fee, and an examination shall be administered upon request.
History: 1953 Comp., § 45-25-16, enacted by Laws 1973, ch. 366, § 16.

76-4-17. Commercial pesticide applicator license.

A. It is unlawful for any person to engage in the business of applying pesticides at any time to land not owned or occupied by him without a commercial pesticide applicator license issued by the department. The commercial pesticide applicator shall pay an annual prescribed fee for each license issued. Should any apparatus fail to pass inspection, making it necessary for an additional inspection to be made, the

department shall require a prescribed inspection fee. In addition to the required inspection, additional inspections may be made to determine if equipment is properly calibrated and maintained in conformance with the Pesticide Control Act and regulations adopted pursuant thereto.

B. Application for a license shall be on a form provided by the department.

C. The department shall not issue a commercial pesticide applicator license until the applicant has passed an examination to demonstrate his knowledge of how to apply pesticides under the classification or classifications he has applied for and his knowledge of the nature and effect of pesticides he may apply. The department shall charge the prescribed examination fee for the initial examination and other examinations needed to qualify the applicant to apply pesticides.

D. The department shall renew any applicant's license under the classification for which the applicant is certified, provided that the applicant's license is not under a suspension or revocation order and he has met the provisions of the Pesticide Control Act.

E. The department shall not issue a commercial applicator license if it has been determined that:

(1) the applicant has been convicted within the last five years of a felony involving fraud;

(2) the applicant has had revoked within the last two years a previous license authorized by the Pesticide Control Act;

(3) the applicant has been unable to satisfactorily fulfill the certification requirements

(4) [the applicant] has had any pesticide application or a license denied, revoked, or suspended in any state in the last five years.

F. All applicants for a commercial applicator license shall meet at least one of the following requirements prior to being issued a license and shall file proof of compliance as specified by the department:

(1) documentation of two years of pesticide application experience in the category or related category for which application is being made

(2) documentation of one year of pesticide application experience in the category or related category for which application is being made and not less than twenty college credit hours in biological or agricultural sciences.

History: 1953 Comp., § 45-25-17, enacted by Laws 1973, ch. 366, § 17; 1979, ch. 394 § 4.

76-4-18. Operator license.

A. It is unlawful for any individual to act as an employee of a commercial pesticide applicator and apply pesticides without having obtained an operator license from the department.

B. The department shall issue an operator license when the applicant has passed an examination to demonstrate his ability to apply pesticides safely and effectively with the type of apparatus and in the classification for which he has applied. The department shall charge the prescribed examination fee for each examination administered.

C. The provisions of this section shall not apply to any individual who is a licensed commercial pesticide applicator.
History: 1953 Comp., § 45-25-18, enacted by Laws 1973, ch. 366, § 18; 1979, ch. 394, § 5.

76-4-19. Application of act to governmental entities; public applicator's license required.

A. All state agencies, federal agencies, and municipal corporations or any other governmental agency shall be subject to the provisions of the Pesticide Control Act and regulations adopted thereunder concerning the application of pesticides unless exempt under other sections of the Pesticide Control Act.

B. Public applicators for agencies listed in this section shall be subject to examinations as provided in the Pesticide Control Act. The department shall issue a limited license without fee to the public applicator who has qualified for such license. The public applicator license shall be valid only when the applicator is acting as an applicator applying or supervising application of restricted use pesticides used by such entities. Government research personnel shall be exempt from this licensing requirement only when applying general use pesticides to experimental plots.
History: 1953 Comp., § 45-25-19, enacted by Laws 1973, ch. 366, § 19; 1979, ch. 394, § 6.

76-4-20. Private applicators.

A. No private applicator shall use a restricted use pesticide without first complying with the certification requirements determined by the department as necessary to prevent unreasonable adverse effects on the environment, including injury to the applicator or other persons.

B. In determining these certification requirements, the board shall take into consideration standards of the United States Environmental Protection Agency. Certification requirements for a private applicator to be certified to use restricted use pesticides may include but shall not be limited to the following:

(1) the applicant shall acknowledge that he understands and will abide by the label precautions by signing a dealer's pesticide register. The register shall include the name and address of the private applicator and other information as prescribed by the department. The dealer shall keep a record of all restricted use pesticides distributed to a private applicator;

(2) the applicant shall obtain a user permit prior to purchase and use of the pesticide. The department may issue restricted use pesticide permits to private applicators who have documented the crops, location, and acreage on the permit for the seasonal or temporary period for which their permit is issued. User permits shall only be issued for registered or experimental uses and shall be subject to other limitations as specified by the department. The limitations may include limiting the areas of use, the timing or method of application, and the amount of the pesticide to that needed to cover the acreage to be treated;

(3) the applicant shall be required to pass a written examination

demonstrating his competency with respect to the use and handling of the pesticide or pesticides covered by his certification prior to purchase and use of the product;

(4) the applicant shall be required to obtain approval from the department for each application involving a specific risk to the environment. The applicant shall submit to the department an application form for a special review permit. The application shall include detailed information on the intended use, the responsible person in charge, and the equipment and conditions under which the pesticide application is to be made. The department in reviewing the application for a special review permit may require additional restrictions such as on-site inspection or supervision.

C. The department shall charge the prescribed fee for each certification.

D. If a private applicator does not qualify, the department shall inform the applicant in writing.

E. Private applicator certification shall be valid for a period of not less than three years, established by the board.

History: 1953 Comp., § 45-25-20, enacted by Laws 1973, ch. 366, § 20; 1979, ch. 394, § 7.

76-4-20.1. Noncommercial applicator license.

A. Any person who is not a private applicator, commercial applicator, or public applicator, except a person working under their direct supervision, shall not use a restricted use or state restricted use pesticide without having a valid current noncommercial applicator license issued by the department for the license use categories and subcategories in which the pesticide application is made.

B. Application for an original or renewal license shall be on a form prescribed by the department. An annual prescribed fee shall be charged for each noncommercial applicator license issued.

C. The department shall not issue a noncommercial applicator license until the applicant has passed a written certification examination to demonstrate to the department his knowledge of how to apply pesticides under the classifications for which he has applied and his knowledge of the nature and effect of pesticides he may apply under such classifications.

D. The department shall renew any applicant's license under the classification for which the applicant is certified, provided that the applicant's license is not under a suspension or revocation order and the applicant has complied with the provisions of the Pesticide Control Act.

E. Nothing in this section shall imply the right to apply pesticides for hire without first having obtained a commercial applicator license.

History: Laws 1979, ch. 394, § 8.

76-4-21. Expiration date of licenses.

The board shall set by regulation the expiration date for the annual pesticide registration or any license provided for in the Pesticide Control Act.

History: 1953 Comp., § 45-25-21, enacted by Laws 1973, ch. 366, § 21; 1979, ch.

394, § 9.

76-4-22. Fees.

A. Fees for the registration of pesticides, the various licenses, inspection of apparatuses, and examination of applicants required by the Pesticide Control Act shall be set by the board not to exceed the amount authorized below:

(1) annual registration fee for each pesticide or device registered, not more than $35.00;

(2) annual pesticide dealer license, for each location or outlet within the state or, if there is no outlet in the state, for the principal out-of-state location or outlet, not more than $50.00;

(3) annual pest management consultant license, not more than $50.00;

(4) annual commercial pesticide applicator license, not more than $75.00;

(5) annual operator license, not more than $50.00;

(6) annual noncommercial applicator license, not more than $50.00;

(7) private applicator certification or renewal, not more than $ 5.00;

(8) additional inspection required to certify each unit of aircraft, ground, or manual equipment that fails to pass inspection, not more than $25.00;

(9) examination fee for each examination needed to qualify the applicant as a pest management consultant, commercial pesticide applicator, noncommercial applicator or operator, or any combination thereof, not more than $ 5.00.

B. If the application for the renewal of a pesticide registration or any annual license provided for in the Pesticide Control Act is not filed prior to the expiration date of the prior registration or license, the fee for such renewal of registration or license shall be double the amount specified in this section and shall be paid by the applicant before the renewal registration or license shall be issued. Any person holding a current valid license may renew his license for the next year without taking an examination, unless the department determines that additional knowledge relating to the classification for which the applicant has applied makes a new examination necessary. However, if the license is not renewed within thirty days after expiration, the licensee shall be required to take new certification examinations.

History: 1953 Comp., § 45-25-22, enacted by Laws 1973, ch. 366, § 22; 1979, ch. 394, § 10.

76-4-23. Grounds for denial, suspension or revocation of license, permit, or certification; acts constituting a violation of the Pesticide Control Act.

A. The department may deny application for any license, permit, or certification or may suspend any license, permit, or certification when it has reason to believe that the applicant for or the holder of such license, permit, or certification has violated any of the provisions of Subsection B of this section.

B. It is a violation of the Pesticide Control Act for any person to:

(1) make a false or fraudulent claim through any media which misrepresents the effect of material or methods to be used;

(2) make a pesticide recommendation or to use a pesticide in a manner

inconsistent with the labeling;

(3) apply known ineffective or improper materials;

(4) operate faulty or unsafe apparatus;

(5) operate in a faulty, careless, or negligent manner;

(6) refuse or, after notice, neglect to comply with the provisions of the Pesticide Control Act or the rules and regulations adopted pursuant thereto;

(7) refuse or neglect to keep and maintain the records or to make reports when and as required by the Pesticide Control Act or rules and regulations adopted pursuant thereto;

(8) make false or fraudulent records, invoices, or reports;

(9) engage in the business of applying a pesticide on the land of another without having a licensed applicator or operator in direct "on-the-job" supervision;

(10) use fraud or misrepresentation in making an application for a license or renewal of a license;

(11) refuse or neglect to comply with any limitation or restriction on or in a duly issued license or permit;

(12) aid or abet a licensed or an unlicensed person to evade any provision of the Pesticide Control Act, conspire with a licensed or an unlicensed person to evade the provisions of the Pesticide Control Act, or allow one's license to be used by an unlicensed person;

(13) make false or misleading statements during or after an inspection concerning any infestation or infection of pests found on land;

(14) impersonate any state, county or city inspector or official;

(15) perform the type of pest control under the conditions and in the locality in which he operates or has operated, whether or not he has previously passed an examination, when not qualified;

(16) use or supervise the use of a pesticide which is restricted to use by certified applicators when not qualified as a certified applicator;

(17) make pesticide recommendations or apply pesticides without having the proper certification or license.

C. Any person who has had a license, permit, or certification denied, suspended, or revoked by the department may request a hearing before the department. The request for a hearing shall be made within fifteen days of receipt of a certified letter notifying him of the department's action.

History: 1953 Comp., § 45-25-23, enacted by Laws 1973, ch. 366, § 23; 1979, ch. 394, § 11.

76-4-24. Surety bond or insurance required of commercial pesticide applicators.

The department shall not issue a commercial pesticide applicator license until the applicant has furnished evidence of financial responsibility with the department consisting either of a surety bond or a liability insurance policy or certification thereof, protecting persons who may suffer legal damages as a result of the operations of the applicant. However, the surety bond or liability insurance policy need not apply to damages or injury to land being worked upon by the applicant. The department shall not accept a surety bond or liability insurance policy except from authorized insurers

or surplus line brokers authorized to do business in the state.

A. The amount of the surety bond or liability insurance as provided for in this section shall be set by the board. The surety bond or liability insurance shall be maintained, at a sum not less than that specified by the board, at all times during the license period. The department shall be notified ten days prior to any reduction made at the request of the applicant or cancellation of the surety bond or liability insurance by the surety or insurer. The department may accept a liability insurance policy or surety bond in the proper sum which has a deductible clause in an amount prescribed by the board. If the applicant has not satisfied the requirements of the deductible amount in any prior legal claim, such deductible clause shall not be accepted by the department unless the applicant furnishes the department with a surety bond or liability insurance which shall satisfy the amount of the deductible pertaining to all claims that may arise in his application of pesticides.

B. The applicator license shall, whenever the surety bond or insurance policy of the licensee is reduced below the requirements of the Pesticide Control Act and regulations adopted pursuant thereto, be automatically suspended until the surety bond or insurance policy again meets these requirements. The department may retrieve the license plates or decal of the licensee during the period of automatic suspension and return them only when the licensee has furnished the department with written proof that he is again in compliance.

C. Nothing in the Pesticide Control Act shall be construed to relieve any person from liability for any damage to the person or lands of another caused by the use of pesticides, even though such use conforms to the rules and regulations of the board.
History: 1953 Comp., § 45-25-24, enacted by Laws 1973, ch. 366, § 24.

76-4-25. Damaged person must file report of loss; contents; time of filing; effect of failure to file.

A. Any person suffering a loss or damage resulting from the use or application by others of any pesticide shall file with the department a verified report of loss setting forth, so far as known to the claimant, the following:

(1) the name and address of the claimant;

(2) the type of land alleged to be injured or damaged;

(3) the name of the person applying the pesticide and allegedly responsible;

(4) the name of the owner or occupant of the property for whom the pesticide application was made;

(5) additional information as requested by the department.

B. The report must be filed within sixty days from the time that the loss or damage becomes known to the claimant. If a growing crop is alleged to have been damaged, the report must be filed prior to harvest of fifty percent of that crop, unless the loss or damage was not then known. The department may prepare a form to be furnished to persons making a report of alleged damages. This form shall contain other requirements as the department deems necessary. The department may, upon receipt of the alleged damage report, notify the licensee and the owner or lessee of the land or other person who may be charged with the responsibility, of the damages

claimed, and furnish copies of the statements as may be requested. The department shall inspect damages whenever possible, and when they determine that the complaint has sufficient merit, they shall make the information available to the person claiming damage and to the person who is alleged to have caused the damage.

C. The filing of a report or the failure to file a report need not be alleged in any complaint which might be filed in a court of law, and the failure to file the report shall not be considered any bar to the maintenance of any action.

D. The failure to file the report shall not be a violation of this act. However, if the person failing to file the report is the only one injured from the use or application of a pesticide by others, the department may, when in the public interest, refuse to hold a hearing for the denial, suspension, or revocation of a license or permit issued under the Pesticide Control Act until the report is filed.

E. Where damage is alleged to have occurred, the claimant shall permit the department, the licensee, and his representatives, such as bondsman or insurer, to observe and examine the lands or nontarget organism alleged to have been damaged. Failure of the claimant to permit the observation and examination of the damaged lands shall automatically bar the claim against the licensee.

History: 1953 Comp., § 45-25-25, enacted by Laws 1973, ch. 366, § 25.

76-4-26. Inspection of equipment.

A. The department shall provide for an annual inspection of any equipment used for the application of pesticides by a commercial pesticide applicator and may require repairs or other changes before the equipment is used to apply pesticides. A list of requirements that the equipment shall meet shall be provided by the department.

B. Any piece of equipment which fails inspection shall have affixed to it an out-of-order seal. The equipment shall not be put back into service until it has passed reinspection and the out-of-order seal is removed by the department. A prescribed inspection fee shall be charged for each reinspection.

History: 1953 Comp., § 45-25-26, enacted by Laws 1973, ch. 366, § 26; 1979, ch. 394, § 12.

76-4-27. License plates or decals for apparatus.

Each licensed apparatus shall be identified by a license plate or decal furnished by the department, at no cost to the licensee. The license plate or decal shall be affixed in a location and manner upon the application apparatus as prescribed by the department.

History: 1953 Comp., § 45-25-27, enacted by Laws 1973, ch. 366, § 27.

76-4-28. Farmer or rancher exemption.

Except for the use of restricted use pesticides, the provisions of the Pesticide Control Act relating to licenses and requirements for their issuance shall not apply to any farmer or rancher owner of a ground or manual apparatus applying pesticides for himself or his farmer or rancher neighbors, when he:

A. operates farm or ranch property and operates and maintains pesticide

application equipment primarily for his own use;

B. is not regularly engaged in the business of applying pesticides for hire amounting to a principal or regular occupation and he does not publicly solicit business as a pesticide applicator;

C. operates his pesticide application equipment only in the vicinity of his own property and for the accommodation of his neighbors.

History: 1953 Comp., § 45-25-28, enacted by Laws 1973, ch. 366, § 28.

76-4-29. Repealed.

76-4-30. Discarding and storing of pesticides and pesticide containers.

No person shall discard, transport, or distribute any pesticide or pesticide container in a manner that may cause injury to humans, vegetation, crops, livestock, wildlife, or beneficial insects or pollute any waterway.

History: 1953 Comp., § 45-25-30, enacted by Laws 1973, ch. 366, § 30.

76-4-31. Access to public or private premises.

A. For the purpose of carrying out the provisions of the Pesticide Control Act, the department is authorized upon presentation of proper identification and with consent of the owner or by court order, to enter any public or private premises, in order to:

(1) inspect any apparatus subject to the Pesticide Control Act and the premises on which the apparatus is kept or stored;

(2) inspect lands actually or reported to be exposed to pesticides;

(3) inspect storage or disposal areas;

(4) inspect or investigate complaints of injury to humans or land;

(5) sample pesticides being applied or to be applied;

(6) sample land, including agricultural products, for pesticide residues.

B. If it appears that a pesticide apparatus or device fails to comply with the provisions of the Pesticide Control Act or regulations adopted thereunder, and if the department contemplates instituting proceedings against any person, the department shall cause notice to be given to the person. Any person so notified shall be given an opportunity to present his views, either orally or in writing, with regard to the contemplated proceedings. If thereafter, in the opinion of the department, it appears that the provisions of the Pesticide Control Act or regulations adopted thereunder have been violated by the person, the department shall refer a copy of the results of the analysis or the examination of the pesticide apparatus or device to the District Attorney for the county in which the violation occurred. It is the duty of the District Attorney to whom any violation of the Pesticide Control Act is reported to cause appropriate proceedings to be instituted and prosecute in a court of competent jurisdiction without delay.

C. Nothing in the Pesticide Control Act shall be construed as requiring the department to report, for prosecution or the institution of condemnation proceedings, minor violations of the Pesticide Control Act when the department believes that the

public interest will be best served by a notice of warning in writing.

D. Should the department be denied access to any land where access was sought for the purposes set forth in the Pesticide Control Act, they may apply to any court of competent jurisdiction for a search warrant for the purpose requested.

History: 1953 Comp., § 45-25-31, enacted by Laws 1973, ch. 366, § 31.

76-4-32. Classification of licenses.

A. The department may classify licenses to be issued under the Pesticide Control Act. Such classifications may include recommending pesticides to be used in or on land, including but not limited to agricultural crops, ornamentals, structures, and noncrop land or to treat regulated products or equipment. If the licensee has a classified license, he shall be limited to practicing within such classification. Each classification shall be subject to separate testing procedures and requirements. No person shall be required to pay an additional license fee if he desires to be licensed in one or all of the license classifications.

B. The department may classify pesticide applicator and operator licenses to be issued under the Pesticide Control Act. The classifications may include but not be limited to pest control operations, fumigators, ornamental or agricultural pesticide applicators, or right-of-way pesticide applicators. Separate classifications may be specified for ground, aerial, or manual methods used by any licensee to apply pesticides or to the use of pesticides to control pests. Each classification shall be subject to separate testing procedures and requirements. No person shall be required to pay an additional license fee if the person desires to be licensed in one or all of the license classifications.

History: 1953 Comp., § 45-25-32, enacted by Laws 1973, ch. 366, § 32.

76-4-33. Records.

A. Any person issued a license or permit under the provisions of the Pesticide Control Act shall keep such records as required by regulation of the board.

B. Commercial pesticide applicators licensed under the provisions of the Pesticide Control Act shall keep such records as prescribed by regulation of the board.

C. The department shall have access to the records at any reasonable time to copy or make copies of the records for the purpose of carrying out the provisions of the Pesticide Control Act. Unless required for the enforcement of the Pesticide Control Act, the information shall be confidential and, if summarized, shall not identify any individual person.

History: 1953 Comp., § 45-25-33, enacted by Laws 1973, ch. 366, § 33.

76-4-34. Penalties.

A. Any person violating any provision or requirement of the Pesticide Control Act or regulations adopted by the board pursuant to that act is guilty of a petty misdemeanor.

B. In addition to any other penalties imposed by the Pesticide Control Act, any

person who willfully or repeatedly violates any provision of that act may be assessed by the court a civil penalty not to exceed one thousand dollars ($1,000) for each violation.

C. The board may bring an action to enjoin the violation or threatened violation of any provision of the Pesticide Control Act or any regulation made pursuant thereto in a court of competent jurisdiction of the county in which the violation occurs or is about to occur.

D. The department, acting as a law enforcement officer, is authorized to file a criminal complaint in a magistrate court for violations of the Pesticide Control Act or regulations adopted pursuant thereto and shall not be required to pay the docket fee.
History: 1953 Comp., § 45-25-34, enacted by Laws 1973, ch. 366, § 34; 1979, ch. 394, § 13.

76-4-35. Persons exempted from certain penalties.

A. The penalties provided for violations of Paragraphs (1) through (5) of Subsection A of Section 5 [76-4-5 NMSA 1978] of the Pesticide Control Act shall not apply to:

(1) any carrier while lawfully engaged in transporting a pesticide within this state, if such carrier shall, upon request, permit the department to copy all records showing the transactions in and movement of the pesticides or devices;

(2) public officials of this state and the federal government while engaged in the performance of their official duties in administering state or federal pesticide laws or regulations or while engaged in pesticide research;

(3) the manufacturer or shipper of a pesticide for experimental use only by or under the supervision of an agency of this state or of the federal government authorized by law to conduct research in the field of pesticides if the manufacturer or shipper holds a valid experimental use permit issued by the department and by the United States Environmental Protection Agency.

B. No pesticide or device shall be deemed in violation of the Pesticide Control Act when intended solely for export to a foreign country and when prepared or packed according to the specifications or directions of the purchaser. If not so exported, all the provisions of the Pesticide Control Act and regulations adopted thereunder shall apply.
History: 1953 Comp., § 45-25-35, enacted by Laws 1973, ch. 366, § 35.

76-4-36. Pesticide advisory board; created; members; purpose; classification of persistent pesticides and determination of essential uses.

A. There is created the "pesticide advisory board" consisting of the dean of the college of agriculture at New Mexico State University, the director of the Environmental Improvement Division of the Health and Environment Department [department of environment], the secretary of natural resources, the secretary of the department of finance and administration, the director of the department or their designees, and four members to be appointed by the director of the department who are residents of this state and three of whom shall be licensed under the provisions of

the Pesticide Control Act. The pesticide advisory board is created to assure the continuation of the basic policy of the state to protect and improve the environment by assuring the proper registration, distribution, and use of pesticides and devices.

B. The pesticide advisory board shall, at least once each year, review pesticide regulations and pesticides in use or proposed to be used in the state and advise which pesticides should not be registered in the state, which should be designated restricted use pesticides, and the use to which restricted use pesticides may be put. In determining the use to which restricted use pesticides may be put, the pesticide advisory board shall consider the need for control of the target pest, whether the use of effective alternate materials is practicable and whether the use of alternate materials is hazardous to the environment or public health and welfare, or both.

C. The findings of the pesticide advisory board shall be submitted to the board in promulgating regulations pursuant to the Pesticide Control Act.

D. Nongovernmental members of the pesticide advisory board shall receive per diem and mileage as provided in the Per Diem and Mileage Act [10-8-1 to 10-8-8 NMSA 1978] for attending official meetings of the pesticide advisory board.

History: 1953 Comp., § 45-25-36, enacted by Laws 1973, ch. 366, § 36; 1977, ch. 253, § 49; 1978, ch. 39, § 1; 1979, ch. 394, §14; 1983, ch. 296, § 29.

76-4-37. Publication of information.

The department may publish, in the form it deems proper, results of products analyzed, based on official samples as compared with the guaranteed analysis and information concerning the distribution and use of pesticides. Individual distribution and use information shall not be a public record. The department may also publish results of samples analyzed for pesticide residues.

History: 1953 Comp., § 45-25-37, enacted by Laws 1973, ch. 366, § 37.

76-4-38. Cooperation.

The department may cooperate, receive grants-in-aid, and enter into cooperative agreements with any agency of the federal government, of this state or its subdivisions, or with any agency of another state, in order to:

A. secure uniformity of regulations;

B. enter into cooperative agreements with the United States environmental protection agency to register pesticides under the authority of the Pesticide Control Act and the federal Environmental Pesticide Control Act;

C. cooperate in the enforcement of the federal Environmental Pesticide Control Act and regulations through the use of state or federal personnel and facilities or both and to implement cooperative enforcement programs including but not limited to the registration of pesticides, collection and analysis of pesticides and devices, inspection of storage facilities, and certification of applicators;

D. enter into contracts with other agencies including federal agencies for the purpose of training pesticide dealers, pesticide management consultants, pesticide applicators or operators;

E. publish information and conduct short courses on the storage, transportation,

distribution, application, use, registration and disposal of pesticides and devices and environmental implications thereof;

F. enter into contracts for either monitoring pesticides or analyzing land, including agricultural products that will be consumed by any living organism other than plants, for pesticide residues, or both;

G. prepare and submit a state plan to meet federal certification standards including issuing experimental use permits;

H. regulate pesticide applicators and operators.

History: 1953 Comp., § 45-25-38, enacted by Laws 1973, ch. 366, § 38.

76-4-39. Disposition of funds.

All moneys received by the department under the provisions of the Pesticide Control Act shall be expended for the purpose of carrying out the provisions of the Pesticide Control Act.

History: 1953 Comp., § 45-25-39, enacted by Laws 1973, ch. 366, § 39.

Adopted by State Board of Education - March 3, 2000

9.13.4 Use of pesticides will be governed by the following standards:

Definitions as used in this section:

"Pesticide" means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.

"Pest" means any living organism injurious to other living organisms, except man, viruses, bacteria, or other microorganisms in or on other living organisms other than plants, which is declared to be a pest pursuant to the Pesticide Control Act.

Districts will develop procedures for the implementation of pest management with consideration for reducing the possible impact of pesticide use on human health and the environment, including people with special sensitivities to pesticides. Procedures will include, but are not limited to, the following:

a. No pesticide may be applied to public school property, and no pest control device as defined in the New Mexico Pesticide Control Act may be used on public school property except those pesticides and devices currently registered for legal use in the state by the New Mexico Department of Agriculture.
b. No pesticide may be applied to public school property except by those persons certified in the applicable category and currently licensed by the New Mexico Department of Agriculture or by employees under their direct supervision.
c. Pesticides will only be applied in or on the outside of school buildings when a pest is present and will not be applied on a regular or "calendar" basis unless it is to treat an infestation and is part of a pest management system being implemented to address a particular target pest. A pest is considered to be present when it is observed directly or can reasonably be expected to be present based on finding evidence such as droppings, body parts, or damage that is typically done by the pest. This section of the regulation does not apply to pre-construction termite treatments or the use of outdoor herbicides.
d. Pesticides that are applied in a liquid, aerosolized, or gaseous form through spraying, aerosol cans, bombs, fumigation, or injections into the ground, foundation, or plants will not be applied on public school property when students, staff, or visitors are present or may reasonably be expected to be present within six hours of the application. In emergency cases where a pest infestation threatens the health and/or safety of the occupants of public school property and which requires the immediate application of a pesticide to remediate, students, staff, and other school occupants will be removed from the treatment area prior to the application. Small amounts of gel or liquid pesticides applied to cracks and crevices or baits used to treat pest infestation are exempt from this

section.

e. At the beginning of each year, and when new students register, schools will develop a list of parents and guardians who wish to be notified prior to pesticide application during the school year. These parents/guardians will be notified in writing prior to pesticide application. General notification of anticipated pesticide applications will occur by posting or dissemination of notices or oral communication or other means of communication. In emergency cases where a pest infestation threatens the health and/or safety of the occupants of public school property, no pre-notification is required. Immediately following the application of a pesticide in emergency cases, signs will be posted indicating an application was made.

f. Written records of pesticide applications will be kept for three (3) years at each school site and be available upon request to parents, guardians, students, teachers, and staff.

g. The State Department of Public Education may coordinate technical assistance for implementation of regulation 9.13.4.

h. If any part of section 9.13.4 is found to be in conflict with the provisions of the Pesticide Control Act, the remainder of the regulation will remain in full force and effect.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
(Excerpts)

References in [] brackets are to title 7, United States Code
Act of June 25, 1947; Chapter 125

Sec. 2. [136] Definitions

For purposes of this act,

(a) Active Ingredient – The term "active ingredient" means

(1) in the case of a pesticide other than a plant regulator, defoliant, or desiccant, or nitrogen stabilizer, an ingredient which will prevent, destroy, repel, or mitigate any pest;

(2) in the case of a plant regulator, an ingredient which, through physiological action, will accelerate or retard the rate of growth or rate of maturation or otherwise alter the behavior of ornamental or crop plants or the product thereof;

(3) in the case of a defoliant, an ingredient which will cause the leaves or foliage to drop from a plant;

(4) in the case of a desiccant, an ingredient which will artificially accelerate the drying of plant tissue; and

(5) in the case of a nitrogen stabilizer, an ingredient which will prevent or hinder the process of nitrification, denitrification, ammonia volatilization, or urease production through action affecting soil bacteria.

(b) Administrator – The term "administrator" means the administrator of the Environmental Protection Agency.

(c) Adulterated – The term "adulterated" applies to any pesticide if

(1) its strength or purity falls below the professed standard of quality as expressed on its labeling under which it is sold;

(2) any substance has been substituted wholly or in part for the pesticide; or

(3) any valuable constituent of the pesticide has been wholly or in part abstracted.

(d) Animal – The term "animal" means all vertebrate and invertebrate species, including but not limited to man and other mammals, birds, fish, and shellfish.

(e) Applicator –

(1) Certified Applicator – The term "certified applicator" means any individual who is certified under section 11 as authorized to use or supervise the use of any pesticide which is classified for restricted use. Any applicator who holds or applies registered pesticides or uses dilutions of registered pesticides consistent with subsection (ee) of this section only to provide a service of controlling pests without delivering any unapplied pesticide to any person so served is not deemed to be a seller or distributor of pesticides under this Act.

(2) Private Applicator – The term "private applicator" means a certified applicator who uses or supervises the use of any pesticide which is classified for restricted use for purposes of producing any agricultural commodity on property owned or rented by the applicator or the applicator's employer or (if applied without compensation other than trading of personal services between producers of

agricultural commodities) on the property of another person.

(3) Commercial Applicator – The term "commercial applicator" means an applicator (whether or not the applicator is a private applicator with respect to some uses) who uses or supervises the use of any pesticide which is classified for restricted use for any purpose or on any property other than as provided by paragraph (2).

(4) Under the Direct Supervision of a Certified Applicator – Unless otherwise prescribed by its labeling, a pesticide shall be considered to be applied under the direct supervision of a certified applicator if it is applied by a competent person acting under the instructions and control of a certified applicator who is available if and when needed, even though such certified applicator is not physically present at the time and place the pesticide is applied.

(f) Defoliant – The term "defoliant" means any substance or mixture of substances intended for causing the leaves or foliage to drop from a plant, with or without causing abscission.

(g) Desiccant – The term "desiccant" means any substance or mixture of substances intended for artificially accelerating the drying of plant tissue.

(h) Device – The term "device" means any instrument or contrivance (other than a firearm) which is intended for trapping, destroying, repelling, or mitigating any pest or any other form of plant or animal life (other than man and other than bacteria, virus, or other microorganism on or in living man or other living animals), but not including equipment used for the application of pesticides when sold separately therefrom.

(i) District court – The term "district court" means a United States district court, the District Court of Guam, the District Court of the Virgin Islands, and the highest court of American Samoa.

(j) Environment – The term "environment" includes water, air, land, and all plants and man and other animals living therein, and the interrelationships which exist among these.

(k) Fungus – The term "fungus" means any non-chlorophyll-bearing thallophyte (that is, any non-chlorophyll-bearing plant of a lower order than mosses and liverworts), for example, rust, smut, mildew, mold, yeast, and bacteria, except those on or in living man or other animals and those on or in processed food, beverages, or pharmaceuticals.

(l) Imminent hazard – The term "imminent hazard" means a situation which exists when the continued use of a pesticide during the time required for cancellation proceeding would be likely to result in unreasonable adverse effects on the environment or will involve unreasonable hazard to the survival of a species declared endangered or threatened by the Secretary of the Interior under Public Law 91-135.

(m) Inert ingredient – The term "inert ingredient" means an ingredient which is not active.

(n) Ingredient statement – The term "ingredient statement" means a statement which contains

(1) the name and percentage of each active ingredient, and the total percentage of all inert ingredients in the pesticide; and

(2) if the pesticide contains arsenic in any form, a statement of the percentages of total and water soluble arsenic, calculated as elementary arsenic.

(o) Insect – The term "insect" means any of the numerous small invertebrate animals

generally having the body more or less obviously segmented, for the most part belonging to the class Insecta, comprising six-legged, usually winged forms, as for example, beetles, bugs, bees, flies, and to other allied classes of arthropods whose members are wingless and usually have more than six legs, as for example, spiders, mites, ticks, centipedes, and wood lice.

(p) Label and labeling –

(1) Label – The term "label" means the written, printed, or graphic matter on or attached to the pesticide or device or any of its containers or wrappers.

(2) Labeling – The term "labeling" means all labels and all other written, printed, or graphic matter

(A) accompanying the pesticide or device at any time; or

(B) to which reference is made on the label or in literature accompanying the pesticide or device, except to current official publications of the Environmental Protection Agency, the United States Departments of Agriculture and Interior, the Department of Health and Human Services, State experiment stations, State agricultural colleges, and other similar Federal or State institutions or agencies authorized by law to conduct research in the field of pesticides.

(q) Misbranded –

(1) A pesticide is misbranded if

(A) its labeling bears any statement, design, or graphic representation relative thereto or to its ingredients which is false or misleading in any particular;

(B) it is contained in a package or other container or wrapping which does not conform to the standards established by the Administrator pursuant to section 25(c)(3);

(C) it is an imitation of or is offered for sale under the name of another pesticide;

(D) its label does not bear the registration number assigned under section 7 to each establishment in which it was produced;

(E) any word, statement, or other information required by or under authority of this act to appear on the label or labeling is not prominently placed thereon with such conspicuousness (as compared with other words, statements, designs, or graphic matter in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use;

(F) the labeling accompanying it does not contain directions for use which are necessary for effecting the purpose for which the product is intended and, if complied with, together with any requirements imposed under section 3(d) of this Act, are adequate to protect health and the environment;

(G) the label does not contain a warning or caution statement which may be necessary and if complied with, together with any requirements imposed under section 3(d) of this act, is adequate to protect health and the environment; or

(H) in the case of a pesticide not registered in accordance with section 3 of this act and intended for export, the label does not contain, in words prominently placed thereon with such conspicuousness (as compared with other words, statements, designs, or graphic matter in the labeling) as to render it likely to be noted by the ordinary individual under customary conditions of purchase and use, the

following: "Not Registered for Use in the United States of America".

(2) A pesticide is misbranded if

(A) the label does not bear an ingredient statement on that part of the immediate container (and on the outside container or wrapper of the retail package, if there be one, through which the ingredient statement on the immediate container cannot be clearly read) which is presented or displayed under customary conditions of purchase, except that a pesticide is not misbranded under this subparagraph if

(i) The size or form of the immediate container, or the outside container or wrapper of the retail package, makes it impracticable to place the ingredient statement on the part which is presented or displayed under customary conditions of purchase; and

(ii) the ingredient statement appears prominently on another part of the immediate container or outside container or wrapper permitted by the Administrator;

(B) the labeling does not contain a statement of the use classification under which the product is registered;

(C) there is not affixed to its container, and to the outside container or wrapper of the retail package, if there be one, through which the required information on the immediate container cannot be clearly read, a label bearing

(i) the name and address of the producer, registrant, or person for whom produced;

(ii) the name, brand, or trademark under which the pesticide is sold;

(iii) the net weight or measure of the content, except that the Administrator may permit reasonable variations; and

(iv) when required by regulation of the Administrator to effectuate the purposes of this Act, the registration number assigned to the pesticide under this Act, and the use classification; and

(D) the pesticide contains any substance or substances in quantities highly toxic to man, unless the label shall bear, in addition to any other matter required by this Act,

(i) the skull and crossbones;

(ii) the word "poison" prominently in red on a background of distinctly contrasting color; and

(iii) a statement of a practical treatment (first aid or otherwise) in case of poisoning by the pesticide.

(r) Nematode – The term "nematode" means invertebrate animals of the phylum Nemathelminthes and class Nematoda, that is, unsegmented round worms with elongated, fusiform, or saclike bodies covered with cuticle, and inhabiting soil, water, plants, or plant parts; may also be called nemas or eelworms.

(s) Person – The term "person" means any individual, partnership, association, corporation, or any organized group of persons whether incorporated or not.

(t) Pest – The term "pest" means

(1) any insect, rodent, nematode, fungus, weed, or

(2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in

living man or other living animals) which the Administrator declares to be a pest under section 25(c)(1).

(u) Pesticide – The term "pesticide" means

(1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest,

(2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, and

(3) any nitrogen stabilizer, except that the term "pesticide" shall not include any article that is a "new animal drug" within the meaning of section 201(w) of the Federal Food, Drug, and Cosmetic Act [21 U.S.C. 321(w)] that has been determined by the Secretary of Health and Human Services not to be a new animal drug by a regulation establishing conditions of use for the article nor one that is an animal feed within the meaning of section 201(x) of such Act [21 U.S.C. 321(x)] bearing or containing a new animal drug. The term "pesticide" does not include liquid chemical sterilant products (including any sterilant or subordinate disinfectant claims on such products) for use on a critical or semi-critical device, as defined in section 201 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 321). For purposes of the preceding sentence, the term "critical device" includes any device which is introduced directly into the human body, either into or in contact with the bloodstream or normally sterile areas of the body and the term "semi-critical device" includes any device which contacts intact mucous membranes but which does not ordinarily penetrate the blood barrier or otherwise enter normally sterile areas of the body.

(v) Plant regulator – The term "plant regulator" means any substance or mixture of substances intended, through physiological action, for accelerating or retarding the rate of growth or rate of maturation or for otherwise altering the behavior of plants or the produce thereof but shall not include substances to the extent that they are intended as plant nutrients, trace elements, nutritional chemicals, plant inoculants, and soil amendments. Also, the term "plant regulator" shall not be required to include any of such of those nutrient mixtures or soil amendments as are commonly known as vitamin-hormone horticultural products intended for improvement, maintenance, survival, health, and propagation of plants and as are not for pest destruction and are nontoxic and nonpoisonous in the undiluted packaged concentration.

(w) Producer and produce – The term "producer" means the person who manufactures, prepares, compounds, propagates, or processes any pesticide or device or active ingredient used in producing a pesticide. The term "produce" means to manufacture, prepare, compound, propagate, or process any pesticide or device or active ingredient used in producing a pesticide. The dilution by individuals of formulated pesticides for their own use and according to the directions on registered labels shall not of itself result in such individuals being included in the definition of "producer" for the purposes of this act.

(x) Protect health and the environment – The terms "protect health and the environment" and "protection of health and the environment" mean protection against any unreasonable adverse effects on the environment.

(y) Registrant – The term "registrant" means a person who has registered any pesticide pursuant to the provisions of this act.

(z) Registration – The term "registration" includes reregistration.

(aa) State – The term "State" means a state, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, the Trust Territory of the Pacific Islands, and American Samoa.
(bb) Unreasonable Adverse Effects on the Environment – The term "unreasonable adverse effects on the environment" means

(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide, or

(2) a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the standard under section 408 of the Federal Food, Drug, and Cosmetic Act [21 U.S.C. 346a].[1] The Administrator shall consider the risks and benefits of public health pesticides separate from the risks and benefits of other pesticides. In weighing any regulatory action concerning a public health pesticide under this act, the Administrator shall weigh any risks of the pesticide against the health risks such as diseases transmitted by the vector to be controlled by the pesticide.

(cc) Weed – The term "weed" means any plant which grows where not wanted.
(dd) Establishment – The term "establishment" means any place where a pesticide or device or active ingredient used in producing a pesticide is produced or held for distribution or sale.
(ee) To Use Any Registered Pesticide in a Manner Inconsistent with Its Labeling – The term "to use any registered pesticide in a manner inconsistent with its labeling" means to use any registered pesticide in a manner not permitted by the labeling, except that the term shall not include

(1) applying a pesticide at any dosage, concentration, or frequency less than that specified on the labeling unless the labeling specifically prohibits deviation from the specified dosage, concentration, or frequency,

(2) applying a pesticide against any target pest not specified on the labeling if the application is to the crop, animal, or site specified on the labeling, unless the Administrator has required that the labeling specifically state that the pesticide may be used only for the pests specified on the labeling after the Administrator has determined that the use of the pesticide against other pests would cause an unreasonable adverse effect on the environment,

(3) employing any method of application not prohibited by the labeling unless the labeling specifically states that the product may be applied only by the methods specified on the labeling,

(4) mixing a pesticide or pesticides with a fertilizer when such mixture is not prohibited by the labeling,

(5) any use of a pesticide in conformance with section 5, 18, or 24 of this act, or

(6) any use of a pesticide in a manner that the Administrator determines to be consistent with the purposes of this act. After March 31, 1979, the term shall not include the use of a pesticide for agricultural or forestry purposes at a dilution less than label dosage, unless before or after that date the Administrator issues a regulation or advisory opinion consistent with the study provided for in section 27(b) of the Federal Pesticide Act of 1978, which regulation or advisory opinion specifically requires the use of definite amounts of dilution.

(ff) Outstanding Data Requirement –

(1) In General – The term "outstanding data requirement" means a requirement for any study, information, or data that is necessary to make a determination under section 3(c)(5) of this title and which study, information, or data

(A) has not been submitted to the Administrator, or

(B) if submitted to the Administrator, the Administrator has determined must be resubmitted because it is not valid, complete, or adequate to make a determination under section 3(c)(5) of this title and the regulations and guidelines issued under such section.

(2) Factors – In making a determination under paragraph (1)(B) respecting a study, the Administrator shall examine, at a minimum, relevant protocols, documentation of the conduct and analysis of the study, and the results of the study to determine whether the study and the results of the study fulfill the data requirement for which the study was submitted to the Administrator.

(gg) To Distribute or Sell – The term "to distribute or sell" means to distribute, sell, offer for sale, hold for distribution, hold for sale, hold for shipment, ship, deliver for shipment, release for shipment, or receive and (having so received) deliver or offer to deliver. The term does not include the holding or application of registered pesticides or use dilutions thereof by any applicator who provides a service of controlling pests without delivering any unapplied pesticide to any person so served.

(hh)Nitrogen Stabilizer – The term "nitrogen stabilizer" means any substance or mixture of substances intended for preventing or hindering the process of nitrification, denitrification, ammonia volatilization, or urease production through action upon soil bacteria. Such term shall not include

(1) dicyandiamide,

(2) ammonium thiosulfate, or

(3) any substance or mixture of substances

(A) that was not registered pursuant to section 3 prior to January 1, 1992, and

(B) that was in commercial agronomic use prior to January 1, 1992, with respect to which after January 1, 1992, the distributor or seller of the substance or mixture has made no specific claim of prevention or hindering of the process of nitrification, denitrification, ammonia volatilization, or urease production regardless of the actual use of purpose for or future use or purpose for, the substance or mixture. Statements made in materials required to be submitted to any State legislative or regulatory authority, or required by such authority to be included in the labeling or other literature accompanying any such substance or mixture shall not be deemed a specific claim within the meaning of this subsection.

(jj)[2] Maintenance Applicator – The term "maintenance applicator" means any individual who, in the principal course of such individual's employment, uses or supervises the use of a pesticide not classified for restricted use (other than a ready to use consumer products pesticide) for the purpose of providing structural pest control or lawn pest control including janitors, general maintenance personnel, sanitation personnel, and grounds maintenance personnel. The term "maintenance applicator" does not include private applicators as defined in section 2(e)(2), individuals who use antimicrobial pesticides, sanitizers or disinfectants, individuals employed by Federal,

State, and local governments or any political subdivisions thereof, or individuals who use pesticides not classified for restricted use in or around their homes, boats, sod farms, nurseries, greenhouses, or other commercial property.

(kk) Service Technician – The term "service technician" means any individual who uses or supervises the use of pesticides (other than a ready to use consumer products pesticide) for the purpose of providing structural pest control or lawn pest control on the property of another for a fee. The term "service technician" does not include individuals who use antimicrobial pesticides, sanitizers, or disinfectants or who otherwise apply ready to use consumer products pesticides.

(ll) Minor Use – The term "minor use" means the use of a pesticide on an animal, on a commercial agricultural crop or site, or for the protection of public health where

(1) the total United States acreage for the crop is less than 300,000 acres, as determined by the Secretary of Agriculture or

(2) the Administrator, in consultation with the Secretary of Agriculture, determines that, based on information provided by an applicant for registration or a registrant, the use does not provide sufficient economic incentive to support the initial registration or continuing registration or a pesticide for such use and

(A) there are insufficient efficacious alternative registered pesticides available for the use;

(B) the alternatives to the pesticide use pose greater risks to the environment or human health;

(C) the minor use pesticide plays or will play a significant part in managing pest resistance; or

(D) the minor use pesticide plays or will play a significant part in an integrated pest management program. The status as a minor use under this subsection shall continue as long as the Administrator has not determined that, based on existing data, such use may cause an unreasonable adverse effect on the environment and the use otherwise qualifies for such status.

(mm) Antimicrobial Pesticide –

(1) In General – The term "antimicrobial pesticide" means a pesticide that

(A) is intended to

(i) disinfect, sanitize, reduce, or mitigate growth or development of microbiological organisms or

(ii) protect inanimate objects, industrial processes or systems, surfaces,
water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime, and

(B) in the intended use is exempt from, or otherwise not subject to, a tolerance under section 408 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 346a and 348) or a food additive regulation under section 409 of such Act.

(2) Excluded Products – The term "antimicrobial pesticide" does not include

(A) a wood preservative or antifouling paint product for which a claim of pesticidal activity other than or in addition to an activity described in paragraph (1) is made;

(B) an agricultural fungicide product; or

(C) an aquatic herbicide product.

(3) Included Products – The term "antimicrobial pesticide" does include any other chemical sterilant product [other that liquid chemical sterilant products exempt under subsection (u)], any other disinfectant product, any other industrial microbiocide product, and any other preservative product that is not excluded by paragraph (2).
(nn) Public Health Pesticide – The term "public health pesticide" means any minor use pesticide product registered for use and used predominantly in public health programs for vector control or for other recognized health protection uses, including the prevention or mitigation of viruses, bacteria, or other microorganisms (other than viruses, bacteria, or other microorganisms on or in living man or other living animal) that pose a threat to public health.
(oo) Vector – The term "vector" means any organism capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including mosquitoes, flies, fleas, cockroaches, or other insects and ticks, mites, or rats.

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[1] Sec. 304 of P.L. 104-170 amended sec.2 (bb) [7 U.S.C. 136(bb)] by inserting "1" and ", or (2)" and all that follows through "346a).", without specifying the act that was being amended. The amendments were executed to this Act to effectuate the probable intent of Congress.
[2] So in original (as added by sec. 120 of P.L. 104-70). This subsection should probably be "(ii)", and subsequent subsections should be redesignated accordingly.

Sec. 12. [136j] Unlawful Acts

(a) In General
(1) Except as provided by subsection (b) of this section, it shall be unlawful for any person in any State to distribute or sell to any person
(A) any pesticide that is not registered under section 3 or whose registration has been canceled or suspended, except to the extent that distribution or sale otherwise has been authorized by the Administrator under this Act;
(B) any registered pesticide if any claims made for it as a part of its distribution or sale substantially differ from any claims made for it as a part of the statement required in connection with its registration under section 3;
(C) any registered pesticide the composition of which differs at the time of its distribution or sale from its composition as described in the statement required in connection with its registration under section 3;
(D) any pesticide which has not been colored or discolored pursuant to the provisions of section 25(c)(5);
(E) any pesticide which is adulterated or misbranded; or
(F) any device which is misbranded.
(2) It shall be unlawful for any person
(A) to detach, alter, deface, or destroy, in whole or in part, any labeling required under this Act;
(B) to refuse to
(i) prepare, maintain, or submit any records required by or under

section 5, 7, 8, 11, or 19

(ii) submit any reports required by or under section 5,6, 7, 8, 11 or 19; or

(iii) allow any entry, inspection, copying of records, or sampling authorized by this Act;

(C) to give a guaranty or undertaking provided for in subsection (b) which is false in any particular, except that a person who receives and relies upon a guaranty authorized under subsection (b) may give a guaranty to the same effect, which guaranty shall contain, in addition to the person's own name and address, the name and address of the person residing in the United States from whom the person received the guaranty or undertaking;

(D) to use for the person's own advantage or to reveal, other than to the Administrator or officials or employees of the Environmental Protection Agency or other Federal executive agencies, or to the courts, or to physicians, pharmacists, and other qualified persons, needing such information for the performance of their duties, in accordance with such directions as the Administrator may prescribe, any information acquired by authority of this Act which is confidential under this act;

(E) who is a registrant, wholesaler, dealer, retailer, or other distributor to advertise a product registered under this act for restricted use without giving the classification of the product assigned to it under section 3;

(F) to distribute or sell or to make available for use or to use any registered pesticide classified for restricted use for some or all purposes other than in accordance with section 3(d) and any regulations thereunder, except that it shall not be unlawful to sell, under regulations issued by the Administrator, a restricted use pesticide to a person who is not a certified applicator for application by a certified applicator;

(G) to use any registered pesticide in a manner inconsistent with its labeling;

(H) to use any pesticide which is under an experimental use permit contrary to the provisions of such permit;

(I) to violate any order issued under section 13;

(J) to violate any suspension order issued under section 3(c)(2)(B), 4, or 6;

(K) to violate any cancellation order issued under this Act or to fail to submit a notice in accordance with section 6(g);

(L) who is a producer to violate any of the provisions of section 7;

(M) to knowingly falsify all or part of any application for registration, application for experimental use permit, any information submitted to the Administrator pursuant to section 7, any records required to be maintained pursuant to this act, any report filed under this act, or any information marked as confidential and submitted to the Administrator under any provision of this act;

(N) who is a registrant, wholesaler, dealer, retailer, or other distributor to fail to file reports required by this act;

(O) to add any substance to or take any substance from any pesticide in a manner that may defeat the purpose of this Act;

(P) to use any pesticide in tests on human beings unless such human

beings

(i) are fully informed of the nature and purposes of the test and of any physical and mental health consequences which are reasonably foreseeable therefrom, and

(ii) freely volunteer to participate in the test;

(Q) to falsify all or part of any information relating to the testing of any pesticide (or any ingredient, metabolite, or degradation product thereof), including the nature of any protocol, procedure, substance, organism, or equipment used, observation made, or conclusion or opinion formed, submitted to the Administrator, or that the person knows will be furnished to the Administrator or will become a part of any records required to be maintained by this Act;

(R) to submit to the Administrator data known to be false in support of a registration; or

(S) to violate any regulation issued under section 3(a) or 19.

(b) Exemptions – The penalties provided for a violation of paragraph (1) of subsection (a) shall not apply to

(1) any person who establishes a guaranty signed by and containing the name and address of the registrant or person residing in the United States from whom the person purchased or received in good faith the pesticide in the same unbroken package, to the effect that the pesticide was lawfully registered at the time of sale and delivery to the person and that it complies with the other requirements of this act, and in such case the guarantor shall be subject to the penalties which would otherwise attach to the person holding the guaranty under the provisions of this act;

(2) any carrier while lawfully shipping, transporting, or delivering for shipment any pesticide or device, if such carrier upon request of any officer or employee duly designated by the Administrator shall permit such officer or employee to copy all of its records concerning such pesticide or device;

(3) any public official while engaged in the performance of the official duties of the public official;

(4) any person using or possessing any pesticide as provided by an experimental use permit in effect with respect to such pesticide and such use or possession; or

(5) any person who ships a substance or mixture of substances being put through tests in which the purpose is only to determine its value for pesticide purposes or to determine its toxicity or other properties and from which the user does not expect to receive any benefit in pest control from its use.

Sec. 18. [136p] Exemption of Federal and State Agencies

The Administrator may, at the Administrator's discretion, exempt any federal or state agency from any provision of this act if the Administrator determines that emergency conditions exist which require such exemption. The Administrator, in determining whether or not such emergency conditions exist, shall consult with the Secretary of Agriculture and the governor of any state concerned if they request such determination.

Basic Principles of the Worker Protection Standard
http://www.epa.gov/oppfead1/safety/workers/principl.htm

The 1992 Worker Protection Standard (WPS) protects over three and a half million people who work with pesticides at over 560,000 workplaces. The WPS represents a major strengthening of national efforts to safeguard the health of agricultural workers and pesticide handlers. Effective implementation of the WPS will substantially lower the risk of pesticide poisonings among agricultural workers and pesticide handlers.

Summary of WPS Requirements

Protection during applications – Applicators are prohibited from applying a pesticide in a way that will expose workers or other persons. Workers are excluded from areas while pesticides are being applied.

Restricted-entry intervals – Restricted-entry intervals must be specified on all agricultural plant pesticide product labels. Workers are excluded from entering a pesticide treated area during the restricted entry interval, with only narrow exceptions.

Personal protective equipment – Personal protective equipment must be provided and maintained for handlers and early-entry workers.

Notification of workers – Workers must be notified about treated areas so they may avoid inadvertent exposures.

Decontamination supplies – Handlers and workers must have an ample supply of water, soap, and towels for routine washing and emergency decontamination.

Emergency assistance – Transportation must be made available to a medical care facility if a worker or handler may have been poisoned or injured. Information must be provided about the pesticide to which the person may have been exposed.

Pesticide safety training and safety posters – Training is required for all workers and handlers, and a pesticide safety poster must be displayed.

Access to labeling and site specific information – Handlers and workers must be informed of pesticide label requirements. Central posting of recent pesticide applications is required.

Who and What Are Covered?

http://www.epa.gov/oppfead1/safety/workers/awsscope.htm

The Worker Protection Standard protects employees on farms, forests, nurseries, and greenhouses from occupational exposure to agricultural pesticides. The regulation covers two types of employees: pesticide handlers (those who mix, load, or apply agricultural pesticides, clean or repair pesticide application equipment, or assist with the application of pesticides in any way) and agricultural workers (those who perform tasks related to the cultivation and harvesting of plants on farms or in greenhouses, nurseries, or forests).

Workers include anyone employed for any type of compensation (including self-employed) doing tasks, such as carrying nursery stock, repotting plants, or watering, related to the production of agricultural plants on an agricultural establishment. Workers do *not* include such employees as office employees, truck drivers, mechanics, and any other workers not engaged in worker/handler activities. Some requirements do, however, apply to all persons, and some requirements apply to anyone who handles pesticide application equipment or cleans or launders pesticide-contaminated personal protective equipment.

The WPS does not apply when pesticides are applied on an agricultural establishment in the following circumstances:

- for mosquito abatement, Mediterranean fruit fly eradication, or similar wide-area public pest control programs sponsored by governmental entities. The WPS does apply to cooperative programs in which the growers themselves make or arrange for pesticide applications.
- on livestock or other animals or in or about animal premises.
- on plants grown for other than commercial or research purposes, which may include plants in habitations, home fruit and vegetable gardens, and home greenhouses.
- on plants that are in ornamental gardens, parks, and public or private lawns and grounds that are intended only for aesthetic purposes or climatic modification.
- by injection directly into agricultural plants. Direct injection does not include "hack and squirt," "frill and spray," chemigation, soil-incorporation, or soil-injection.
- in a manner not directly related to the production of agricultural plants, such as structural pest control, control of vegetation along rights-of-way and in other noncrop areas, and pasture and rangeland use.
- for control of vertebrate pests.
- as attractants or repellents in traps.
- on the harvested portions of agricultural plants or on harvested timber.
- for research uses of unregistered pesticides.

For more information on the scope of the WPS, consult the regulation.

Worker Protection Program Fact Sheet:
Final Rule Amendment – Training Requirements
http://www.epa.gov/oppfead1/safety/workers/trainreq.htm

In April 1995, EPA completed a final rule amendment to the WPS regarding the grace period (time before a worker must be trained) and the retraining interval for worker pesticide safety training.

Background

In a January 1995 Federal Register Notice, EPA addressed concerns raised by farmworker groups and agricultural employer groups regarding the grace period and the retraining period for worker pesticide safety training. In this Notice, the agency proposed various options to modify these WPS requirements and solicited public comment. The Agency has considered comments received and has issued a final determination.

Summary of Final Rule Amendment

The five-day grace period for worker training will become effective January 1, 1996. Beginning January 1, 1996, agricultural employers must assure that untrained workers receive basic pesticide safety information before they enter a treated area on the establishment. No more than five days after their initial employment has commenced, all untrained agricultural workers must receive the complete WPS pesticide safety training. The retraining interval for workers and handlers is 5 years.

Discussion

As of January 1, 1996, the agricultural employer shall assure that a worker receives basic pesticide safety information before they enter a treated area on the establishment. This would provide basic safety information to workers while they wait for the complete WPS pesticide safety training, which is required within the first 5 days of entering a treated area. The agricultural employer must assure the information is communicated to agricultural workers in a manner they can understand. In cooperation with USDA and States, EPA will develop and distribute a model handout that will provide the basic pesticide safety information. Agricultural employers may use this handout, develop their own, or use other materials that contain the required basic safety information. Agricultural employers must be able to verify compliance with this requirement.

The basic pesticide safety information must include the following concepts:

- pesticides may be on or in plants, soil, irrigation water, or drifting from nearby applications.
- prevent pesticides from entering your body by: following directions and/or signs about keeping out of treated or restricted areas; washing before eating, drinking, using chewing gum or tobacco, or using the

toilet; wearing work clothing that protects the body from pesticide residues; washing/showering with soap and water, shampoo hair and put on clean clothes after work; washing work clothes separately from other clothes before wearing them again; washing immediately in the nearest clean water if pesticides are spilled or sprayed on the body and, as soon as possible, showering, shampooing, and changing into clean clothes.
· further training will be provided within 5 days.

For more information call (703) 305-7666 or (703) 305-7371.

What is a Pesticide?
http://www.epa.gov/opp00001/whatis.htm

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses.

Though often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests. Under United States law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

Many household products are pesticides. Did you know that all of these common products are considered pesticides?

- Cockroach sprays and baits
- Insect repellents for personal use
- Rat and other rodent poisons
- Flea and tick sprays, powders, and pet collars
- Kitchen, laundry, and bath disinfectants and sanitizers
- Products that kill mold and mildew
- Some lawn and garden products, such as weed killers
- Some swimming pool chemicals

By their very nature, most pesticides create some risk of harm to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms. At the same time, pesticides are useful to society because of their ability to kill potential disease-causing organisms and control insects, weeds, and other pests. In the United States, the Office of Pesticide Programs of the Environmental Protection Agency is chiefly responsible for regulating pesticides.

Biologically-based pesticides, such as pheromones and microbial pesticides, are becoming increasingly popular and often are safer than traditional chemical pesticides. Here are some common kinds of pesticides and their function.

- Algicides control algae in lakes, canals, swimming pools, water tanks, and other sites.
- Antifouling agents kill or repel organisms that attach to underwater surfaces, such as boat bottoms.
- Antimicrobials kill microorganisms (such as bacteria and viruses).
- Attractants attract pests (for example, to lure an insect or rodent to a trap); food is not considered a pesticide when used as an attractant.
- Biocides kill microorganisms.
- Disinfectants and sanitizers kill or inactivate disease-producing microorganisms on inanimate objects.
- Fungicides kill fungi (including blights, mildews, molds, and rusts).
- Fumigants produce gas or vapor intended to destroy pests in buildings or soil.
- Herbicides kill weeds and other plants that grow where they are not wanted.

· Insecticides kill insects and other arthropods.
· Miticides (also called acaricides) kill mites that feed on plants and animals.
· Microbial pesticides kill microorganisms that kill, inhibit, or outcompete pests, including insects, or other microorganisms.
· Molluscicides kill snails and slugs.
· Nematicides kill nematodes (microscopic, worm-like organisms that feed on plant roots).
· Ovicides kill eggs of insects and mites.
· Pheromones are biochemicals used to disrupt the mating behavior of insects.
· Repellents repel pests, including insects (such as mosquitoes) and birds.
· Rodenticides control mice and other rodents.

The term pesticide also includes these substances.

· Defoliants cause leaves or other foliage to drop from a plant, usually to facilitate harvest.
· Desiccants promote drying of living tissues, such as unwanted plant tops.
· Insect growth regulators disrupt the molting, maturity from pupal stage to adult, or other life processes of insects.
· Plant growth regulators are substances (excluding fertilizers or other plant nutrients) that alter the expected growth, flowering, or reproduction rate of plants.

What about pest control devices? EPA also has a role in regulating devices used to control pests. Specifically, a "device" is any instrument or contrivance (other than a firearm) intended for trapping, destroying, repelling, or mitigating any pest. A mousetrap is an example of a device. Unlike pesticides, EPA does not require devices to be registered with the Agency. Devices are subject to certain labeling, packaging, record keeping, and import/ export requirements, however.

What is not a pesticide? The U.S. definition of pesticides is quite broad, but it does have some exclusions: drugs used to control diseases of humans or animals (such as livestock and pets) are not considered pesticides; such drugs are regulated by the Food and Drug Administration. Fertilizers, nutrients, and other substances used to promote plant survival and health are not considered plant growth regulators and thus are not pesticides. Biological control agents, except for certain microorganisms, are exempted from regulation by EPA. Biological control agents include beneficial predators such as birds or ladybugs that eat insect pests. Finally, EPA has also exempted certain other low-risk substances, such as cedar chips, garlic, and mint oil.

United States Environmental Protection Agency
Office of Pesticide Programs

Warning Signs

http://www.epa.gov/pesticides/safety/workers/warning.htm

Warning signs must be posted to warn agricultural workers in advance about pesticide applications. Warning signs must be in English and either Spanish or an alternate language spoken by the workers.

Rule Amendment

In June 1996, EPA amended the Worker Protection Standard (WPS) to modify the warning sign size and language requirement.

In September 1995, EPA had proposed to allow growers to substitute another language for the Spanish portion of the warning sign and to allow the use of a small size sign in nurseries and greenhouses where use of the standard (14"x16") sign interfered with operations and the clear identification of a treated area. EPA considered the comments received from growers, farmworker groups, state agencies, and private citizens and issued a final determination to allow other languages to improve the effectiveness of the signs in warning workers whose predominant language is not Spanish and to permit smaller signs in greenhouses and nurseries.

Summary of Final Rule Amendment

Allows substitution of the language commonly spoken and read by workers for the Spanish portion of the warning sign. The sign must be in the format required by the WPS and be visible and legible. Use of alternative languages is optional and continued use of the English/Spanish sign is always acceptable.

Allows use of smaller signs provided minimum letter size and posting distances are observed. In nurseries and greenhouses, small signs may be used at any time. A small sign may be used on farms and forests if the treated area is too small to accommodate the standard sign.

Sign Size and Posting Minimum Requirements

The posting and lettering requirements for the smaller signs will result in sign sizes of approximately 7 inches by 8 inches and 4 1/2 inches by 5 inches.

Sign Size	Circle Graphic Height	DANGER & PELIGRO Lettering Height	Other Lettering Height	Posting Distance
7" x 8"	3"	7/8"	1/2"	50'
4½ x 5"	1½"	7/16"	1/4"	25'

Warning Signs in Other Languages

To assist agricultural employers with preparing warning signs in other languages, the following signs are reproduced below. All warning signs must be visible, legible, and in the required format. For more information, contact EPA at (703) 305-7666.

United States Environmental Protection Agency
Office of Pesticide Programs

Pest Control in the School Environment: Adopting Integrated Pest Management
http://www.epa.gov/pesticides/ipm/brochure/

Step 1: Developing an Official Policy Statement for School Pest Management

A policy statement for school pest management should state the intent of the school administration to implement an IPM program. It should briefly provide guidance on what specifically is expected: the incorporation of existing services into an IPM program and the education and involvement of students, staff, and pest manager.

Step 2: Designating Pest Management Roles

The concepts and methods of IPM were developed originally in agricultural settings. Later, it was found that IPM had great value in school pest management as well.

The interactions of the people involved in a school pest management system are the key to the success or failure of the program. When the respective roles of all the people in the pest management system are identified and agreed upon, and when these people communicate well with each other, effective and less expensive protection of the site and the people can be achieved with fewer risks.

In successful urban pest management systems, people function effectively as occupants, pest managers, or decision-makers, gaining the information they need, giving the information that others need, cooperating with each other, and meeting their special responsibilities to achieve the unique pest management objectives of the site. These functions and responsibilities are identified below and should be outlined in the school's pest management plan.

Students and Staff - The Occupants

Occupants are concerned about the safety of the pest control methods used, about their effectiveness, and about possible adverse effects. School staff, students, and their parents should receive information addressing these concerns and their roles in the school's pest management system.

The most important responsibility of the students and staff is sanitation. Much of the prevention and reduction of pest infestation at the school site depends on whether or not students and staff clean up food leftovers, food in lockers, gum under desks, paper clutter, etc., or perform proper maintenance. In addition, because people at the school site may observe the presence of pests, they should report any evidence of pest activity.

Other actions may be required of students and staff or undertaken by them, depending

on their interest in the site and the pest management system. The more occupants "buy in" to this, the better the pest management system will work.

Parents' Special Roles

Parents have the most responsibility for their children, and they are their children's natural advocates. Thus, parents can bring the need to reduce dependence on pesticides to the attention of school personnel, and they can assist greatly in the transition to an IPM program.

Parents' first school pest management responsibility is to learn about IPM practices and follow them at home so that pests are not carried to school in notebooks, lunch boxes, clothing, or the children's hair. Second, parents should be aware of the current pest management practices in their children's schools. The schools should welcome questions by the parents and encourage the parents to seek information. Visible interest and concern on the parents' part is a valuable resource and stimulus for the implementation of a school IPM program. Parents may express their views to the school superintendent, School Board, school district management, and the school's Parent Teacher Associations (PTA). Parents may participate on IPM advisory or oversight committees with school and government management.

The Pest Manager

In a pest management system, the pest manager is the person who observes and evaluates the site, or directs others to do so, and decides what needs to be done to achieve the site pest management objectives. The pest manager could be the school principal, the custodian, a designated faculty member or an individual under contract to the school system. The pest manager designs a pest management system that takes into account potential liability, applicator and occupant safety, costs, effectiveness, time required, and customer or occupant satisfaction.

The pest manager draws on knowledge gained through prior training and uses information on the site, the pest and its biology, occupant health and concerns, appropriate control measures, and expected results. The pest manager also performs the necessary pest management actions or directs others in the actions to be taken.

Because the pest manager usually has the responsibility of keeping both the occupants and school administrators informed, he or she has the greatest need for available information about the site, pest, and appropriate pest management methods.

The system for the site must achieve the goals within the limitations posed by safety, time, money, and available materials. Pest managers monitor the site and the pest population to determine if actions taken are successful and must keep accurate records of the amount and location of any pesticides used and dates of each application.

Decision-Makers

Generally, persons who authorize the pest management program and control the money for pest management are people involved in the direct management or administration of the school or schools, such as a superintendent or assistant superintendent of schools. However, a person indirectly involved with the site may become a pest management decision-maker, e.g., the health department inspector. On other occasions, the purchasing agent or contracting officer for a school system or district may be a major decision-maker for a school site.

For decision-makers, concerns about costs, liability, time expended, method effectiveness, safety, and customer or occupant satisfaction are foremost. These decision-makers also determine if the pest manager is performing at an acceptable level and if the pest management objectives are being met. Among other methods, this assessment can be done by monitoring complaints from the occupants, by observing the site environment, or by a combination of both. Decision-makers must also provide the necessary level of financial commitment for any IPM program to succeed.

A great deal of understanding, cooperation, and commitment from everyone in the system – students and parents, school staff, managers, administrators, and the public – is needed iin order for an IPM program to succeed.

Educating IPM Participants

A school IPM program should include a commitment to the education of students, staff, and parents. This education should include not only the teachers, but also school nurses, cafeteria employees, and housekeeping and administrative personnel as well. All occupants must understand the basic concepts of IPM and who to contact with questions or problems. Specific instructions should be provided on what to do and what not to do. For example, staff should not bring and use pesticides on their own on school sites. All pesticide products, including those purchased at a retail store, should be applied only by designated qualified personnel. Educating and training staff to function within an IPM context is important to the success of an in-house IPM program. (Note: More specific training is required for the pest manager. Universities and State Cooperative Extension Services have the expertise to meet most IPM training needs. Needed training materials that are not already available can be developed jointly between the School District and the Extension Service.)

Education is a vital component of pest management. Many schools across the United States have incorporated environmental issues into their curricula. Science classes might include discussions and activities to learn more about the fascinating and diverse roles of insects, plants, rodents, and birds in our world. Most are harmless, and many (e.g., some spiders, predatory mites, centipedes, and certain beetles) are actually beneficial in controlling pest populations. If good sanitation is practiced, the population these beneficial insects can be kept a tolerable levels.

All staff at the school should learn a the basic concepts of IPM and how these principles are being applied in their particular school. Staff and students need to understand how their own behavior helps alleviate or contributes to pest problems. School staff should encourage the Parent Teacher Associations, student organizations, and other school-affiliated groups to participate the IPM program.

Step 3: Setting Pest Management Objective for Sites

Pest management objectives differ from site to site, and these differences must be considered before setting action threshold levels (see step 5.) For example, for an athletic field, the objective would be to maintain healthy turf as well as a specific type of playing surface. With ornamental plants, the objective would more likely be to maintain aesthetic value. With buildings or other structures, the main objective might be controlling damage caused by termites. Schools should outline specific objectives in a pest management plan.

Examples of pest management objectives include the following.

- Manage pests that may occur on school sites to prevent interference with the learning environment of the students.
- Eliminate injury to students, staff, and other occupants.
- Preserve the integrity of the school buildings or structures.
- Provide the safest playing or athletic surfaces possible.

Step 4: Inspecting, Identifying, and Monitoring

An IPM program consists of a cycle of inspecting, identifying, monitoring, evaluating, and choosing the appropriate method of control. Routine inspection and accurate identification of pests are vital steps in IPM to ensure that control methods will be effective. Once the pest has been identified and the source of its activity pinpointed, habitat modifications – primarily, exclusion, repair, and sanitation efforts – may greatly reduce the prevalence of the pest. Monitoring includes inspecting areas for pest evidence, entry points, food, water, and harborage sites, and estimating pest population levels. The information gained through monitoring is evaluated to determine whether the action threshold has been exceeded and what can be done in the way of prevention.

Step 5: Setting Action Thresholds

An action threshold is the level at which action is initiated. It is determined by deciding, based on the sensitivities of the school occupants, how many pests can be tolerated. The action threshold is set by the pest manager and the occupants and should reflect the pest management objective for the site. The presence of some pests does not, in itself, necessarily require action.

When pest populations exceed preset action thresholds, action must be taken. Precise recommendations or actions to achieve specific results are an essential part of

an IPM program. Specific recommendations, including an explanation of the benefits, should be based on the evaluation of all available data obtained through inspecting, identifying, and monitoring.

Step 6: Apply IPM Strategies

Pest-prevention measures can be incorporated into existing structures. Such preventive measures reduce the need for pesticide applications and include sanitation and structural repair, employing physical and mechanical controls such as screens, traps, weeders, air doors, etc. Specific IPM strategies for specific school sites are provided below. (Note: Every school will experience slightly different combinations of pests.)

IPM Strategies for Indoor Sites

Typical Pests: mice, rats, cockroaches, ants, flies, wasps, hornets, yellow jackets, spiders, microorganisms, termites, carpenter ants, and other wood-destroying insects. Although beneficial as predators, wasps, hornets, yellow jackets, and spiders can be troublesome.

Entryways (doorways, overhead doors, windows, holes in exterior walls, openings around pipes, electrical fixtures, or ducts):

- Keep doors shut when not in use.
- Place weather stripping on doors.
- Caulk and seal openings in walls.
- Install or repair screens.
- Install air curtains.
- Keep vegetation, shrubs, and wood mulch at least 1 foot away from structures.

Classrooms and Offices (classrooms, laboratories, administrative offices, auditoriums, gymnasiums, and hallways):

- Allow food and beverages only in designated areas.
- If indoor plants are present, keep them healthy. When small insect infestations appear, remove them manually. Keep areas as dry as possible by removing standing water and water damaged or wet materials
- In the science lab, store animal foods in tightly sealed containers and regularly clean cages. In all areas, remove dust and debris.
- Routinely clean lockers and desks.
- Frequently vacuum carpeted areas.
- If students get head lice, consult with your local health department and have their parents contact a physician. Discourage students from exchanging hats or caps at school.

Food Preparation and Serving Areas (dining room, main kitchen, teachers' lounge,

home economics kitchen, snack area, vending machines, and food storage rooms):

· Store food and waste in containers that are inaccessible to pests. Containers must have tight lids and be made of plastic, glass, or metal. Waste should be removed at the end of each day.
· Place screens on vents, windows, and drains to prevent cockroaches and other pests from using unscreened ducts or vents as pathways.
· Create inhospitable living conditions for pests by reducing availability of food and water. Remove food debris, sweep up all crumbs, fix dripping faucets and leaks, and dry out wet areas.
· Improve cleaning practices, including promptly cleaning food preparation equipment after use and removing grease accumulation from vents, ovens, and stoves. Use caulk or paint to seal cracks and crevices.
· Capture rodents by using mechanical or glue traps. (Note: place traps in areas inaccessible to children. Mechanical traps, including glueboards, used in rodent control must be checked daily. Dispose of killed or trapped rodents within 24 hours.)

Rooms and Areas With Extensive Plumbing (bathrooms, rooms with sinks, locker rooms, dishwasher rooms, home economics classrooms, science laboratories, swimming pools, and greenhouses):

· Promptly repair leaks and correct other plumbing problems to deny pests access to water.
· Routinely clean floor drains, strainers, and grates. Seal pipe chases.
· Keep areas dry. Avoid conditions that allow formation of condensation. Areas that never dry out are conducive to molds and fungi. Increasing ventilation may be necessary.
· Store paper products or cardboard boxes away from moist areas and direct contact with the floor or the walls. This practice also allows for ease in inspection.

Maintenance Areas (boiler room, mechanical room, janitorial-housekeeping areas, and pipechases):

· After use, promptly clean mops and mop buckets; dry mop buckets and hang mops vertically on rack above floor drain.
· Allow eating only in designated eating areas.
· Clean trash cans regularly, use plastic liners in trash cans, and use secure lids.
· Keep areas clean and as dry as possible, and remove debris.

IPM Strategies for Outdoor Sites

Typical Pests: mice and rats; turf pests (broadleaf and grassy weeds, insects such as beetle grubs or sod webworms, diseases such as brown patch, and vertebrates such as moles); ornamental plant pests (plant diseases, and insects such as thrips, aphids, Japanese beetles, and bag worms).

Playgrounds, parking Lots, athletic fields, loading docks, and refuse dumpsters:

- Regularly clean trash containers and gutters and remove all waste, especially food and paper debris.
- Secure lids on trash containers.
- Repair cracks in pavement and sidewalks.
- Provide adequate drainage away from the structure and on the grounds.

Turf (lawns, athletic fields, and playgrounds):

- Maintain healthy turf by selecting a mixture of turf types (certified seed, sod, or plugs) best adapted for the area. Check university or Cooperative Extension Service for recommendations on turf types, management practices, or other information.
- Raise mowing height for turf to enhance its competition with weeds; adjust cutting height of mower, depending on the grass type; sharpen mower blades; and vary mowing patterns to help reduce soil compaction.
- Water turf infrequently but sufficiently during early morning hours to let turf dry out before nightfall; let soil dry slightly between waterings.
- Provide good drainage, and periodically inspect turf for evidence of pests or diseases.
- Allow grass clippings to remain in the turf (use a mulching mower or mow often) or compost with other organic material. Have the soil tested to determine pH and fertilizer requirements.
- Use a dethatcher to remove thatch. Do this in early fall or early spring when the lawns can recover and when overseeding operations are likely to be more successful.
- Time fertilizer application appropriately because excessive fertilizer can cause additional problems, including weed and disease outbreaks. Apply lime if necessary. Use aeration to place soil on top of thatch so that microbes from soil can decompose thatch.
- Seed over existing turf in fall or early spring.
- Obtain more information on turf from EPA's brochure entitled *Healthy Lawn, Healthy Environment: Caring for Your Lawn in an Environmentally Friendly Way* (http://www.epa.gov/oppfead1/Publications/lawncare.pdf, 1.7 MB, PDF format).

Ornamental Shrubs and Trees:

- Apply fertilizer and nutrients to annuals and perennials during active growth and to shrubs and trees during dormant season or early in the growing season.
- If using a fertilizer, use the correct one at the suitable time, water properly, and reduce compaction.
- Prune branches to improve plants and prevent access by pests to structures.
- Use the appropriate pest-resistant variety (check with your local Cooperative Extension Service), and properly prune for growth and structure.

· Correctly identify the pest in question. When in doubt, send several specimens to your local Cooperative Extension Service. Once the pest is identified, recommendations can be made.
· Use pheromone traps as a timesaving technique for determining the presence and activity periods of certain pest species. Pheromones are chemicals released by various organisms as means of communication with others of the same species, usually as an aid to mating.
· Select replacement plant material from among the many disease-resistant types being developed by plant breeders throughout the country.
· Check with your local State Cooperative Extension Service or university for information on plant types appropriate for your site.
· Remove susceptible plants if a plant disease recurs and requires too many resources, such as time, energy, personnel, or money. Some ornamental plants, trees, and turf are so susceptible to plant diseases that efforts to keep them healthy may be futile.

Applying Pesticides Judiciously

Many different kinds of pesticides are currently available for use against urban and structural pests. An appropriate application uses the least toxic and most effective and efficient technique and material. Due to their potentially toxic nature, these materials should be applied by qualified applicators in a manner to ensure maximum efficiency, with minimal hazard. Pesticides should be applied only when occupants are not present in areas where they may be exposed to materials applied.

Although EPA registers pesticides for use within the United States, the fact that a particular product is registered does not mean that it is "safe" under all conditions of use. All pesticides used in the U.S. must be EPA registered, and the registration number must be listed on the label. Read and follow the pesticide label directions, know how to apply and handle these chemicals, and try to minimize the exposure to children, adults, and other non-target species.

The following general recommendations should minimize exposure to people and other non-target species when the application of pesticides is being considered.

· Read and follow all label instructions.
· Choose a pesticide that is labeled for the specific site, intended for the pest you are trying to control, and as target specific as possible, rather than broad spectrum.
· Use a spot-treatment method of application when pesticide treatments are required. Treat only the obviously infested plants in an area. This procedure helps conserve predators and parasites needed to reduce future pest populations and increases the time between pest outbreaks.
· Limit the use of sprays, foggers, or volatile formulations. Instead, use bait and crack and crevice application when possible. Look for crack and crevice label instructions on how to apply the pesticide. These

treatments maximize the exposure of the pest to the pesticide while minimizing pesticide exposure for the occupants.

· Place all rodenticides either in locations not accessible to children and non-target species or in tamper-resistant bait boxes. Outdoors, place bait inside the entrance of an active rodent burrow, and then collapse the burrow entrance over the bait to prevent non-target species' access. Securely lock or fasten shut the lids of all bait boxes. Place bait in the baffle-protected feeding chamber of the box. Never place bait in the runway of the box.

· Apply only when occupants are not present or in areas where they will not be exposed to the material applied. Note any re-entry time limits listed on the label, and be aware that some residues can remain long after application.

· Use proper protective clothing or equipment when applying pesticides.

· Properly ventilate areas after pesticide application.

· Notify students, staff, and interested parents of upcoming pesticide applications if that is part of the school pest management policy. Pay particular attention to those individuals that may be at higher risk.

· Keep copies of current pesticide labels, consumer information sheets, and Material Safety Data Sheets (MSDS) easily accessible.

Storing Pesticides

Store pesticides off site or in buildings that are locked and inaccessible to all undesignated personnel. Be sure adequate ventilation is provided for the pesticide storage area. Store herbicides separately to avoid potential damage to plants from the absorption of vapors onto other pesticides stored nearby. Avoid storing pesticides in places where flooding is possible or in open places where they might spill or leak into the environment. Store flammable liquids away from an ignition source. Check for state recommendations and requirements for pesticide storage.

If pesticides are stored in occupied buildings, take special care to ensure that the air in the occupied spaces does not get contaminated. Place a notice outside the designated storage area. Store all pesticides in their original containers, and secure lids tightly. Make sure that childproof caps are properly fastened. However, even closed pesticide containers may release toxic chemicals to the air through volatilization. Therefore, store pesticides only in spaces that are physically separated and closed off from occupied spaces and where there is adequate exhaust ventilation (i.e., the air is vented directly to the outside). In addition, precautions are needed to ensure that the air in the storage space has no chance of mixing with the air in the central ventilation system.

The pest manager is responsible for periodically checking stored pesticide containers for leaks or other hazards. To reduce pesticide storage problems, buy only enough of the pesticide product to last through the use season. Mix only the amount of pesticide needed for the immediate application.

Posting and Notification

Local law may require schools to notify students and staff of impending pesticide applications. If not, the school system may take the responsibility of informing school staff and students' parents of upcoming pesticidal treatments. When good IPM practices are followed, concerns raised by notification and posting activities may be minimized. If notification and posting is a new practice at the school, the new policy should be explained so that it will not be misinterpreted to imply that more pesticides are being applied than previously. Notification can be accomplished by posting notices around the school and sending notices home to those parents who wish to be informed in advance of pesticide applications. Schools should consider posting notices in areas to be treated or that have been treated. The school pest manager should be prepared and be available to provide more specific information to concerned parents and others. A voluntary registry of individuals who could be adversely affected by exposure to pesticides can be kept at the school health or administrative offices. Information on how to contact the local poison control center and emergency personnel should be kept readily accessible. The school may also wish to consider informing the adjacent community in advance of planned outdoor pesticide applications.

Step 7: Evaluating Results and Record Keeping

Successful practice of IPM relies on accurate record keeping. Record keeping allows the school to evaluate the results of practicing IPM to determine if pest management objectives have been met. Keeping accurate records also leads to better decision-making and more efficient procurement. Accurate records of inspecting, identifying, and monitoring activities show changes in the site environment (reduced availability of food, water, or shelter), physical changes (exclusion and repairs), pest population changes (increased or reduced numbers, older or younger pests), or changes in the amount of damage or loss.

A complete and accurate pest management log should be maintained for each property and kept in the office of the pest manager or property manager. Pesticide use records should also be maintained to meet any requirements of the state regulatory agency, School Board, and applicable local regulations. The log book should contain the following items.

- A copy of the Pest Management Plan and service schedule for the property.
- A copy of the current EPA-registered label and the current MSDS for each pesticide product used on school property.
- Pest surveillance data sheets, which record, in a systematic fashion, the type and number of pests or other indicators of pest population levels revealed by the monitoring program for the site. Examples include date, number, location, and rodent species trapped or carcasses removed as well as date, number, and location of new rat burrows observed.
- A diagram noting the location of pest activity, including the location of all traps, trapping devices, and bait stations in or around the site.

Migratory Bird Treaty Act of 1918
http://laws.fws.gov/lawsdigest/migtrea.html

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) as amended by: Chapter 634; June 20, 1936; 49 Stat. 1556; P.L. 86-732; September 8, 1960; 74 Stat. 866; P.L. 90-578; October 17, 1968; 82 Stat. 1118; P.L. 91-135; December 5, 1969; 83 Stat. 282; P.L. 93-300; June 1, 1974; 88 Stat. 190; P.L. 95-616; November 8, 1978; 92 Stat. 3111; P.L. 99-645; November 10, 1986; 100 Stat. 3590 and P.L. 105-312; October 30, 1998; 112 Stat. 2956.

The original 1918 statute implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Soviet Union (now Russia).

Specific provisions in the statute include:

- Establishment of a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention... for the protection of migratory birds... or any part, nest, or egg of any such bird." (16 U.S.C. 703). This prohibition applies to birds included in the respective international conventions between the U.S. and Great Britain, the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Russia.
- Authority for the Secretary of the Interior to determine, periodically, when, consistent with the Conventions, "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any... bird, or any part, nest or egg" could be undertaken and to adopt regulations for this purpose. These determinations are to be made based on "due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times of migratory flight." (16 U.S.C. 704).
- A decree that domestic interstate and international transportation of migratory birds which are taken in violation of this law is unlawful, as well as importation of any migratory birds which are taken in violation of Canadian laws. (16 U.S.C. 705).
- Authority for Interior officials to enforce the provisions of this law, including seizure of birds illegally taken which can be forfeited to the U.S. and disposed of as directed by the courts. (16 U.S.C. 706).
- Establishment of fines for violation of this law, including misdemeanor charges. (16 U.S.C. 707)
- Authority for States to enact and implement laws or regulations to allow for

greater protection of migratory birds, provided that such laws are consistent with the respective Conventions and that open seasons do not extend beyond those established at the national level. (16 U.S.C. 708).

- A repeal of all laws inconsistent with the provisions of this Act. (16 U.S.C. 710).
- Authority for the continued breeding and sale of migratory game birds on farms and preserves for the purpose of increasing the food supply. (16 U.S.C. 711).

The 1936 statute implemented the Convention between the U.S. and Mexico for the Protection of Migratory Birds and Game Mammals. Migratory bird import and export restrictions between Mexico and the U.S. were also authorized, and in issuing any regulations to implement this section, the Secretary of Agriculture was required to consider U.S. laws forbidding importation of certain mammals injurious to agricultural and horticultural interests. Monies for the Secretary of Agriculture to implement these provisions were also authorized.

The 1960 statute (P.L. 86-732) amended the MBTA by altering earlier penalty provisions. The new provisions stipulated that violations of this Act would constitute a misdemeanor and conviction would result in a fine of not more than $500 or imprisonment of not more than six months. Activities aimed at selling migratory birds in violation of this law would be subject to fine of not more than $2000 and imprisonment could not exceed two years. Guilty offenses would constitute a felony. Equipment used for sale purchases was authorized to be seized and held, by the Secretary of the Interior, pending prosecution, and, upon conviction, be treated as a penalty.

Section 10 of the 1969 amendments to the Lacey Act (P.L. 91-135) repealed the provisions of the MBTA prohibiting the shipment of wild game mammals or parts to and from the U.S. or Mexico unless permitted by the Secretary of the Interior. The definition of "wildlife" under these amendments does not include migratory birds, however, which are protected under the MBTA.

The 1974 statute (P.L. 93-300) amended the MBTA to include the provisions of the 1972 Convention between the U.S. and Japan for the Protection of Migratory Birds and Birds in Danger of Extinction. This law also amended the title of the MBTA to read, "An Act to give effect to the conventions between the U.S. and other nations for the protection of migratory birds, birds in danger of extinction, game mammals, and their environment."

Section 3(h) of the Fish and Wildlife Improvement Act of 1978 (P.L. 95-616) amended the MBTA to authorize forfeiture to the U.S. of birds and their parts illegally taken, for disposal by the Secretary of the Interior as he deems appropriate. These amendments also authorized the Secretary to issue regulations to permit Alaskan natives to take migratory birds for their subsistence needs during established seasons. The Secretary was required to consider the related migratory bird conventions with

Great Britain, Mexico, Japan, and the Soviet Union in establishing these regulations and to establish seasons to provide for the preservation and maintenance of migratory bird stocks.

Public Law 95-616 also ratified a treaty with the Soviet Union specifying that both nations will take measures to protect identified ecosystems of special importance to migratory birds against pollution, detrimental alterations, and other environmental degradations. (See entry for the Convention Between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment; T.I.A.S. 9073; signed on November 19, 1976, and approved by the Senate on July 12, 1978; 92 Stat. 3110.)

Public Law 99-645, the 1986 Emergency Wetlands Resources Act, amended the Act to require that felony violations under the MBTA must be "knowingly" committed.

P.L. 105-312, Migratory Bird Treaty Reform Act of 1998, amended the law to make it unlawful to take migratory game birds by the aid of bait if the person knows or reasonably should know that the area is baited. This provision eliminates the "strict liability" standard that was used to enforce Federal baiting regulations and replaces it with a "know or should have known" standard. These amendments also make it unlawful to place or direct the placement of bait on or adjacent to an area for the purpose of taking or attempting to take migratory game birds, and makes these violations punishable under title 18 United States Code, (with fines up to $100,000 for individuals and $200,000 for organizations), imprisonment for not more than 1 year, or both. The new amendments require the Secretary of Interior to submit to the Senate Committee on Environment and Public Works and the House Committee on Resources a report analyzing the effect of these amendments and the practice of baiting on migratory bird conservation and law enforcement. The report to Congress is due no later than five years after enactment of the new law.

P.L. 105-312 also amends the law to allow the fine for misdemeanor convictions under the Migratory Bird Treaty Act to be up to $15,000 rather than $5000.

Interim Empty Nest Policy of the U. S. Fish and Wildlife Service, Region 2

Effective May 2000

The following is the Interim policy of the Region 2 Migratory Bird Office regarding the need for permits to remove/destroy nuisance empty bird nests. Under this interpretation, empty nests are those nests that contain no live eggs or nestlings. Empty nests include nests under construction by adult birds. This interim policy is in effect pending review by the D.O.I. Solicitors Office of the scope of applicability of the Migratory Bird Treaty Act (MBTA) to empty nests. Possession of nests in the absence of a valid permit continues to fall under the prohibitions of the MBTA.

1. **Solitary-Nesting Birds** (species that do not cluster nests in colonies - all species except the groups listed under Colonial-Nesting Birds below).

   A permit is not needed for any individual to remove or destroy nuisance empty nests of non-colonial species of birds. If live eggs or nestlings are present in the nest, or if recently fledged birds are returning to roost in the nest at night until they achieve complete independence from the adult birds, then those nests may not be destroyed.

2. **Colonial-Nesting Birds** (species placing nests in dense multiple nest colonies - some grebes, pelicans, cormorants, herons, egrets, ibis, spoonbills, storks, gulls, terns, skimmers, swifts, some swallows).

   A.) **Inactive or Abandoned Colonies**. In cases where a colony is no longer active (*i.e.* no evidence of the colonial species using the colony site for nesting purposes in the current year), then those old nests may be destroyed at any time without the need for a permit. In cases where a colony that was active during the current year abandons the site for whatever reason (*e.g.* weather; forced abandonment), then those nests may not be removed without permit until after the nesting season would normally be over (September through February). Reasons: (a) Birds may resume nesting after responsible weather factor abates; (b) in cases where abandonment is due to deliberate harassment to reduce depredation damages, the colony is often only partially abandoned and is therefore still (partially) active. Take of nests must be done by trained Wildlife Services personnel (see below). If all birds abandon the colony (which can be difficult to determine), the depredation problem is resolved and there should be no need to rush to remove the nests. Removal can commence after nesting would normally be over for the year.

   B.) **Active or Partially Active Colonies**. Empty nests may be destroyed without permit at the beginning of the nesting season, up until such time as the first egg is laid by any bird in that colony. Once egg laying has commenced by any of those birds, all nest destruction must cease.

Destruction of empty nests in an active or partially active colony will likely threaten surrounding nests that contain eggs or nestlings; therefore it will not be allowed except on a case-by-case basis as determined by the Migratory Bird Permits Office. Nest destruction may resume at the end of the nesting season without a permit only after all nesting activities by all birds in the colony have ceased, which is usually by September 1 *(i.e.* after all nestlings have fledged and left the site and no eggs are being incubated by late nesters). At such time nests containing infertile/abandoned/dead eggs or long-dead nestlings may also be destroyed without permit.

Permitting and Related Nest Issues.

Permits will not be issued for activities constituting unintentional (incidental) take (*i.e.* when take of the nest contents is not the ultimate purpose of the activity, but is an incidental result of an otherwise legal activity, such as construction of buildings or roads). Unintentional take of nests with live eggs or nestlings remains a violation of the MBTA.

Permits to take active nests (containing eggs or nestlings) of colonial species for Depredation Control purposes will also not be issued by the Migratory Bird Permits Office. Destruction of such active nests must be done by trained personnel of the U.S.D.A. - Wildlife Services.

Please direct questions to the Region 2 Migratory Bird Permits Office (505-248-7882).

GLOSSARY

abdomen – the posterior body segment of an insect

acaricide – a compound that kills mites and ticks

annual – a plant which completes its life cycle in one growing season

antenna (plural: antennae) – a segm ented, sensory structure on an organism's head; usually paired

anthracnose – a condition of gray or brown dead spots on leaves, caused by several different fungi

arachnid – an arthropod which has two body segments and eight legs

arthropod – an invertebrate with a jointed exoskeleton

autotrophic – capable of synthesizing energy without consuming other organisms

axillary – in the leaf axil (the point where a leaf joins a stem)

bacterium (plural: bacteria) – a single-celled microorganism which may feed on living or dead materials; some species are autotrophic

biennial – a plant which completes its life cycle over two growing seasons, usually germinating and forming a rosette the first year then flowering and setting seed in the second year

biological control – a pest management method utilizing living organisms as predators or pathogens

bird – a biped vertebrate with wings and feathers; most species are capable of unassisted flight

bulb – a swollen, underground plant stem which contains an undeveloped plant surrounded by scales (undeveloped leaves)

canopy – the aboveground portion of a plant; usually refers to a plant in leaf

carnivore – an organism which eats meat

caterpillar – the larval stage of a moth or butterfly

chemical control – a pest management method utilizing natural or synthetic compounds

class – see "classification"

classification – a standard method of sorting organisms by similar characteristics, in a progression from least to most precise, as follows: kingdom, phylum, class, order, family, genus, species

cool season – describing an annual plant which completes its life cycle from autumn to spring

cotyledon – a "seed leaf"; the leaf which emerges from a seed after germination and precedes true leaves

creeping – describing a plant that grows laterally by rhizomes or stolons; a perennial weed that reproduces both by seed and vegetatively

crown (turf) – a compressed, aboveground stem which is the growing point of grasses

cultural control – a pest management method emphasizing prevention through healthy ecosystems

deciduous – describing a woody plant which sheds its leaves annually, usually in autumn

dicot – a plant with two cotyledons

dioecious – describing a plant with separate male and female floral components

disease – an illness caused by a pathogen

disorder – an illness caused by an environmental factor

diurnal – active in daylight

dormancy – the resting stage of an organism; a period of no or little growth or activity, usually in winter

ecosystem – a space where species interact with the environment

environment – the collective factors which influence an organism at any given time

evergreen – a plant whose leaves persist throughout the year

exoskeleton – a chitinous, protective shell enclosing an invertebrate

family – see "classification"

fungicide – a compound that kills fungi

fungus (plural: fungi) – a microscopic, usually multicellular organism which decomposes dead – or, sometimes, living – materials for nutrients

genus (plural: genera) – see "classification"

germination – the start of plant growth from a seed

gestation – the pre-birth development stage of mammals

grub – the larval stage of a beetle

harborage – shelter; protection

herbaceous – describing a plant whose canopy is frozen each winter and regrows in the spring

herbicide – a compound that kills plants

herbivore – an organism which eats plants

hibernation – the resting stage of an organism; a period of no or little growth or activity, usually in winter

host – the food source of a parasite or predator

hypha (plural: hyphae) – a unit of mycelium

inoculum – the means of disease transmission, such as a spore

insect – an arthropod which has three body segments and six legs

insecticide – a compound that kills insects

insectivore – an organism which eats insects

inspection – the process of examining a space for pests

instar – the stage of insect development between molts

invertebrate – an animal which lacks an internal skeleton

IPM – integrated pest management; a system for pest treatment that emphasizes the least hazardous, most effective control methods available

kingdom – see "classification"

larva (plural: larvae) – an immature, worm-like stage of insects with complete metamorphosis

maggot – the larval stage of a fly

mammal – a warm-blooded, haired vertebrate

mandible – a biting or chewing organ of some insects

mechanical control – a pest management method utilizing physical exclusion techniques

metamorphosis – conspicuous changes in form or structure during insect development

microorganism – an organism that can not be seen unaided

migratory – describing an animal (usually a bird or fish) which spends alternate portions of its life in two geographically distant areas

miticide – a compound that kills mites

mollusk – a soft-bodied, non-segmented invertebrate without jointed appendages, sometimes encased in a calcareous shell

molt – the shedding process of an animal's outermost layer; occurs in birds, reptiles, insects, and mammals

monitoring – repeated inspection for pests

monocot – a plant with one cotyledon

monoecious – describing a plant with only male or only female floral components

MSDS – material safety data sheet; a document which contains assorted characteristics, hazards, handling procedures, and exposure treatments of synthetic chemicals

mycelium – a mass of hyphae forming the "body" of a fungus

nocturnal – active in darkness

nymph – an immature stage of insects with gradual metamorphosis; resembles the adult stage

omnivore – an animal that eats both meats and plants

order – see "classification"

organic – in common usage, describing an ecosystem without synthetic compounds; in scientific terms, describing a compound that contains carbon

organism – any living thing

overwinter – to pass through the winter in a state of hibernation or dormancy

parasite – an organism that lives on or in a host and obtains nourishment from the host without returning any benefit to the host and without killing the host

parasitoid – an organism which matures inside a host, feeding on that host and resulting in the host's death

pathogen – an organism capable of causing disease

perennial – a plant that lives for more than two years

pest – an organism considered by humans to be annoying or harmful

pesticide – a compound that kills pests

photosynthesis – the process by which plants produce stored energy

phylum – see "classification"

plant – an immobile, terrestrial organism capable of creating its own food through photosynthesis

PPE – personal protective equipment; garments or other items which act as barriers to pesticide exposure

predator – an animal which consumes other animals for food

prostrate – describing a plant which grows close to the ground via stolons

pupa (plural: pupae) – the development stage between larva and adult in insects with complete metamorphosis

reptile – a cold-blooded vertebrate covered in scales

rhizome – a swollen, underground, horizontal stem, usually with more than one growing point

rinsate – the solution remaining after rinsing an object

rodent – a mammal with large incisors

rodenticide – a compound that kills rodents

rosette – a cluster of leaves without a visible stem

sanitation – cleanliness

scavenge – to search for any available food

seed – the dormant, reproductive stage of most higher plants

shrub – a woody plant with multiple dominant stems and which usually is smaller than a tree

simple – a weed that does not grow laterally; a weed that usually reproduces only by seed

snake – a legless reptile

species (plural: species; abbreviations: sp., spp.) – a reproductively isolated, naturally distinct group of organisms; see "classification"

spider – an insectivorous arachnid

spider mite – an herbivorous arachnid

spore – the dormant, reproductive stage of fungi and lower plants (ferns and mosses)

stem – the portion of a plant which usually supports leaves and circulates water and nutrients

stolon – an aboveground, horizontal stem

synthetic – man-made; not naturally occurring

thorax – the central body segment of an insect, to which are attached the legs and wings

treatment – the application of a procedure or item to alleviate a problem

tree – a woody plant with a single, dominant stem and which usually is larger than a shrub

tuber – a swollen, underground stem containing several growth points

vegetative – a form of reproduction via non-flowering parts of a plant, resulting in offspring genetically identical to the parent

vertebrate – an animal with an internal skeleton

virus – an ultramicroscopic particle which requires host tissue for replication

warm season – describing an annual plant that completes its life cycle from spring to autumn

weed – a plant that is competitive, persistent, and pernicious; a plant which interferes with human activities and is therefore undesirable

woody – describing a plant whose aboveground stems persist year round

Pest Control Checklist – Interior Spaces

Client Name _____ **Department** _____

Location _____ **Date** _____

Facility _____ **Time** _____

Phone # _____

	YES	NO	N/A
I. Food storage, preparation, and consumption areas			
A. Packaged food storage			
1. Pest evidence	____	____	____
2. Proper storage practices followed	____	____	____
3. Good housekeeping/cleanliness	____	____	____
4. Empty containers clean and dry	____	____	____
B. Cold food storage			
1. Pest evidence	____	____	____
2. Condensation	____	____	____
3. Cleaning satisfactory (spills, mildew, etc.)	____	____	____
4. Presence of spoiled foods	____	____	____
5. Containers tightly sealed	____	____	____
C. Food preparation areas			
1. Enclosed areas easily opened	____	____	____
2. Spaces under and behind equipment clean	____	____	____
3. Counters and surfaces clean	____	____	____
4. Evidence of food storage	____	____	____
5. Pest evidence	____	____	____
D. Dishwashing areas			
1. Clean	____	____	____
2. Plumbing in good repair	____	____	____
3. Pest evidence	____	____	____

	YES	NO	N/A
E. Lunch room			
1. Accessible for cleaning	____	____	____
2. Sanitary	____	____	____
3. Pest evidence	____	____	____
F. Vending machines			
1. Clean	____	____	____
2. Pest evidence	____	____	____
3. Serviced regularly	____	____	____
II. Service areas			
A. Trash/garbage storage			
1. Adequate space and ventilation	____	____	____
2. Area clean	____	____	____
3. Containers clean and in good repair	____	____	____
4. Containers equipped with secure fitting lids	____	____	____
5. Pest evidence	____	____	____
B. Utility areas			
1. Clean	____	____	____
2. Pest evidence	____	____	____
III. Comfort stations			
A. Toilet facilities			
1. Adequate for current number of users	____	____	____
2. Sanitary and in good repair	____	____	____
3. Door is self-closing and does not open into food area	____	____	____
4. Adequate ventilation and no offensive odor	____	____	____
5. Pest evidence	____	____	____

	YES	NO	N/A
B. Locker rooms			
1. Adequate ventilation and no offensive odor	____	____	____
2. Lockers regularly emptied and clean	____	____	____
3. Area free of old clothes and trash	____	____	____
4. Adequate for current number of users	____	____	____
5. Sanitary and in good repair	____	____	____
6. Door is self-closing and does not open into food area	____	____	____
7. Pest evidence	____	____	____
C. Handwashing stations			
1. Adequate and convenient	____	____	____
2. Appropriate trash receptacles	____	____	____
3. Plumbing in good repair	____	____	____
4. Towel waste disposed of regularly	____	____	____
5. General cleanliness	____	____	____

Other remarks: _____

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Report reviewed:

	NAME	SIGNATURE	DATE
Inspector	_____	_____	_____
Client	_____	_____	_____
Manager	_____	_____	_____

Pest Control Checklist – Exterior Spaces

Client Name _____ **Department** _____

Location _____ **Date** _____

Facility _____ **Time** _____

Phone # _____

	YES	NO	N/A
I. Structures			
1. Structure in good repair	_____	_____	_____
2. Pest entry points	_____	_____	_____
3. Pest evidence	_____	_____	_____
4. Trash/garbage storage area and containers clean	_____	_____	_____
5. Trash disposed of regularly	_____	_____	_____
6. Water collects on paved surfaces	_____	_____	_____
7. Pest exclusion methods applied	_____	_____	_____
8. Adequate lighting	_____	_____	_____
II. Plants			
1. Evidence of pests	_____	_____	_____
2. Bark damage	_____	_____	_____
3. Evidence of nutrient deficiency/toxicity	_____	_____	_____
4. Proper pruning procedures followed	_____	_____	_____
5. Suitable exposure to sunlight	_____	_____	_____
6. Puddles or dry spots on ground	_____	_____	_____
7. Damage from natural causes (lightning, wind)	_____	_____	_____
8. Evidence of material spills	_____	_____	_____
9. Digging or construction damage	_____	_____	_____

Other remarks: _____

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Report reviewed:

	NAME	SIGNATURE	DATE
Inspector	_____	_____	_____
Client	_____	_____	_____
Manager	_____	_____	_____

Interpretation of Pesticide Label Statements

Label Statement	Acceptable PPE
Long-sleeved shirt and long pants	Long-sleeved shirt and long pants OR Woven or non-woven coverall OR Plastic or other barrier-coated coverall OR Rubber or plastic suit
Coverall worn over short-sleeved shirt and short pants	Coverall worn over short-sleeved shirt and short pants OR Coverall worn over long-sleeved shirt and long pants OR Coverall worn over another coverall OR Plastic or other barrier-coated coverall OR Rubber or plastic suit
Coverall worn over long-sleeved shirt and long pants	Coverall worn over long-sleeved shirt and long pants OR Coverall worn over another coverall OR Plastic or other barrier-coated coveral OR Rubber or plastic suit
Chemical-resistant apron worn over coverall or over long-sleeved shirt and long pants	Chemical-resistant apron worn over coverall or over long-sleeved shirt and long pants OR Plastic or other barrier-coated coverall OR Rubber or plastic suit
Chemical-resistant protective suit	Plastic or other barrier-coated coverall OR Rubber or plastic suit
Waterproof gloves	Any rubber or plastic gloves sturdy enough to remain intact throughout the task being performed
Chemical-resistant gloves	Barrier-laminate gloves OR Other gloves that glove selection charts or guidance documents indicate are chemical-resistant to the pesticide for the period of time required to perform the task
Chemical-resistant gloves such as butyl or nitrile	Butyl gloves OR Nitrile gloves OR Other gloves that glove selection charts or guidance documents indicate are chemical-resistant to the pesticide for the period of time required to perform the task

Shoes	Leather, canvas, or fabric shoes OR Chemical-resistant shoes OR Chemical-resistant boots OR Chemical-resistant shoe coverings (booties)
Chemical-resistant footwear	Chemical-resistant shoes OR Chemical-resistant boots OR Chemical-resistant shoe coverings (booties)
Chemical-resistant boots	Chemical-resistant boots
Chemical-resistant hood or wide-brimmed hat	Rubber or plastic-coated safari-style hat OR Rubber or plastic-coated firefighter-style hat OR Plastic or other barrier-coated hood OR Rubber or plastic-hood OR Full hood or helmet that is part of some respirators

Some source material adapted from: "Personal Protective Equipment Guide: Coveralls, Gloves, and other Skin Protectants", US Environmental Protection Agency and US Department of Agriculture Cooperative Extension Service.

GENERAL LABEL FOR A GENERAL USE PESTICIDE

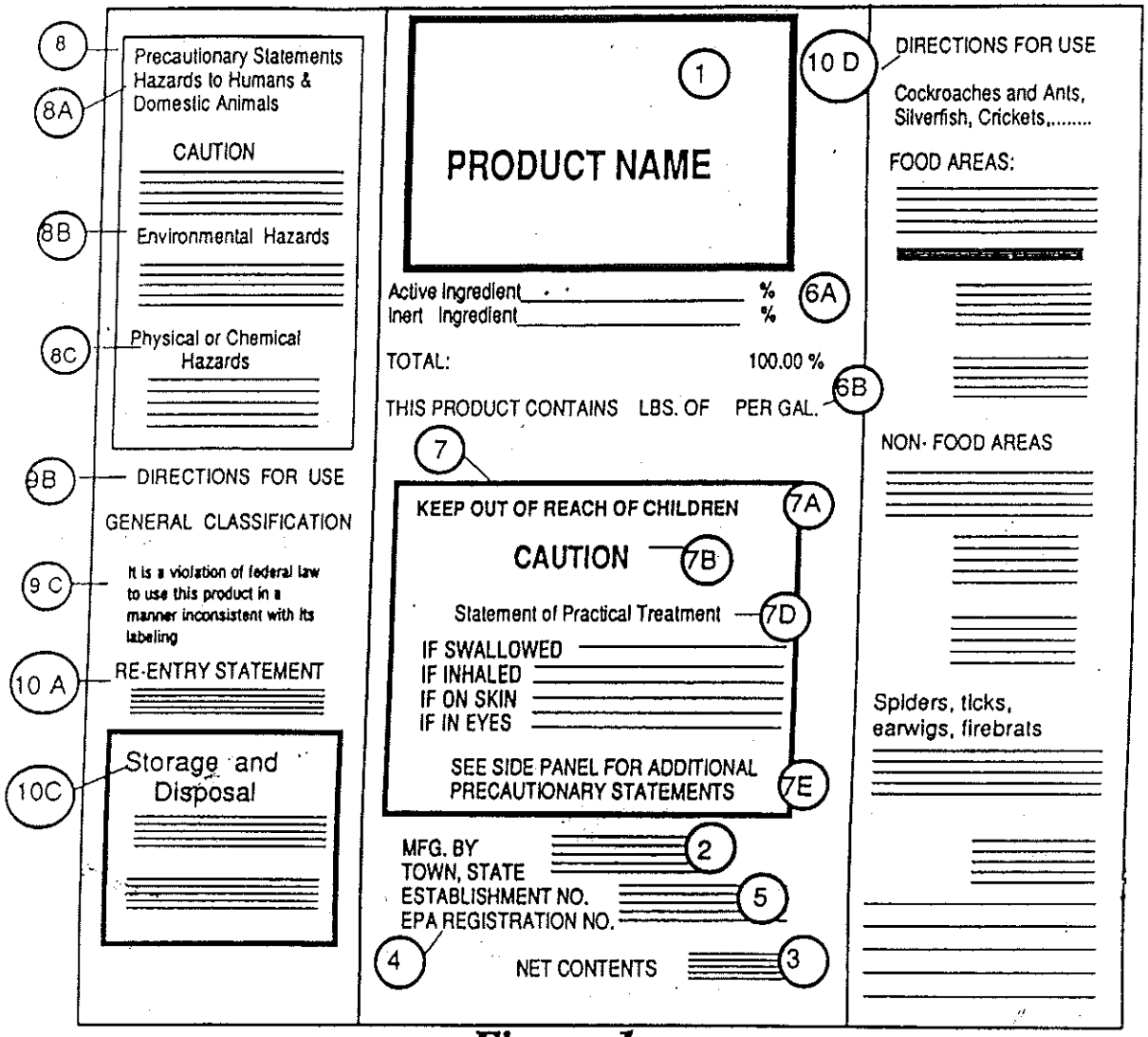

Figure 1

GENERIC LABELS FOR A RESTRICTED-USE PESTICIDE

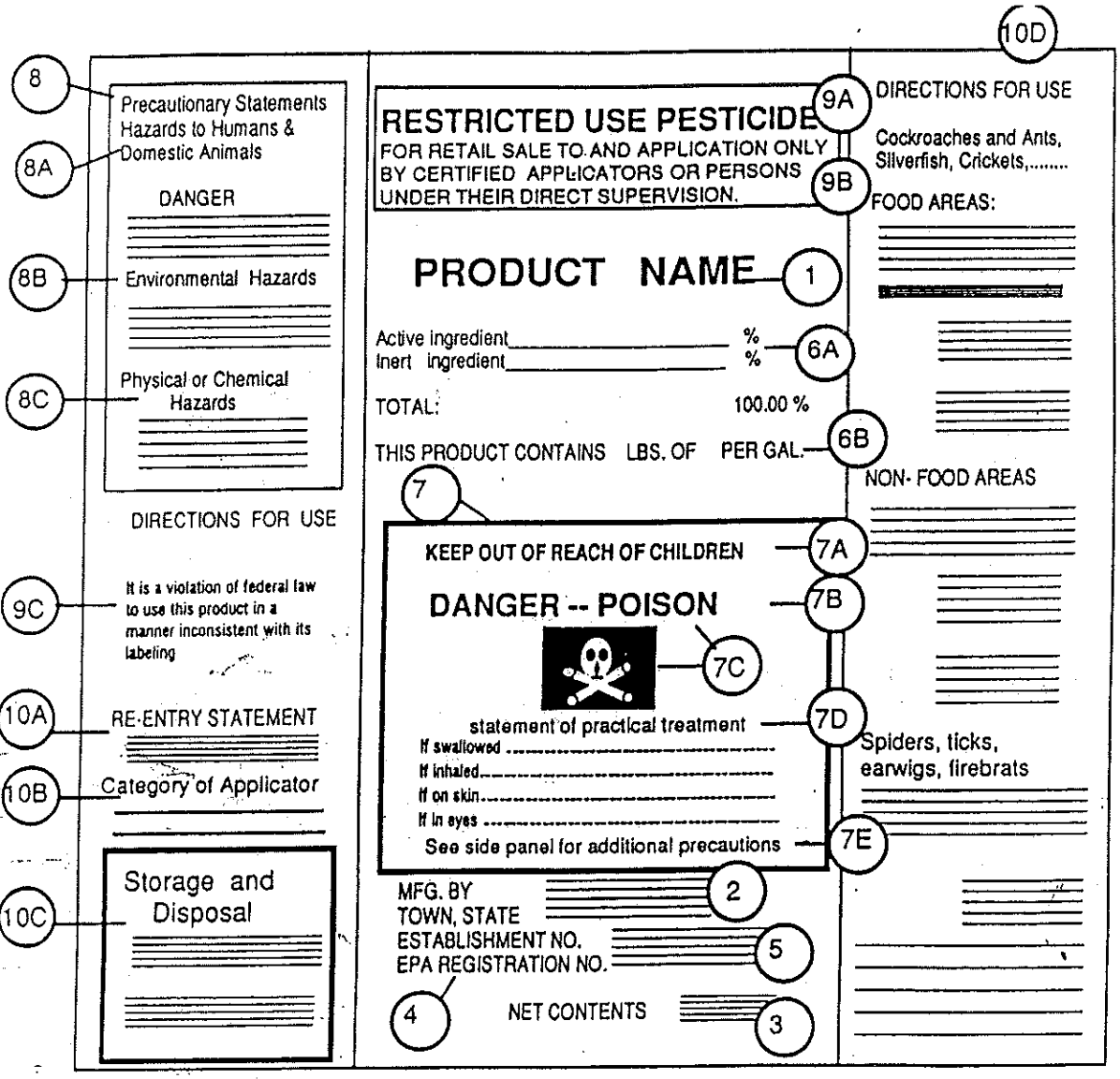

Figure 2