APPENDIX A

ANSWERS TO REVIEW QUESTIONS

Chapter 1 Integrated Pest Management

(1) Integrated pest management is a planned pest control program that combines control strategies to keep the pest population below economically damaging levels and to avoid adverse effects to humans, wildlife, and the environment.

(2) Cultural control – examples: host-plant resistance, maintaining healthy plants, changing the timing of harvest or planting, cultivation, field management, water management.

Biological control—examples: pathogens, parasitoids, predators.

Chemical control—examples: insecticide, herbicide, fungicide.

(3) Economic threshold—the number of pests (pest density) that requires a control action to prevent the pest population from increasing and causing economic damage.

(4) B. (5) D. (6) C.

(7) Cultural controls work by (1) preventing the pest from colonizing the crop or commodity, (2) creat-ing adverse conditions that reduce survival of the pest, and (3) reducing the impact of injury by the pest.

(8) A. (9) C. (10) B. (11) A. (12) B.

(13) C. (14) B. (15) A. (16) A. (17) B. (18) B.

(19) Tolerance is the amount of acceptable pesticide residue permitted by the Environmental Protection Agency (EPA) on a harvested crop.

(20) D. (21) A. (22) B. (23) C. (24) B. (25) D. (26) C. (27) A.

Chapter 2. Minimizing Pesticide Impact

(1) A.

(2) A supplemental label is any information from the manufacturer about how to use the product. Examples: special local needs labels (24c), emergency exemption labels (section 18), and use information issued by the manufacturer.

(3) B. (4) C. (5) D. (6) A. (7) B. (8) D.

(9) B. (10)B.

(11) Any five of the following are correct: use integrated pest management, consider the geology of the area, carefully select pesticides that are not likely to leach, follow pesticide label directions,.calibrate your equipment, measure accurately, avoid back-siphoning, consider weather conditions at the time of application, mix on an impervious pad, properly dispose of all pesticide wastes, and store pesticides away from water sources.

(12) C. (13) B. (14) A. (15) B. (16) A. (17) B.

(18) B. (19) A.

(20) 1. A map of all areas where pesticide applications occur.

2. A list of pesticide-sensitive sites near an application area.

3. Pesticide label and mandated restrictions.

4. Information for persons in sensitive areas on the type of pesticide used, the method of application, and the applicator's plan to minimize pesticide drift.

Chapter 3 Application Equipment

(1) D.

(2) The method of a pesticide application is influenced by target pest, the site of application, the available application equipment, and the cost and efficiency of alternative control methods.

(3) A. (4) A. (5) D. (6) C. (7) B. (8) A.

(9) B. (10) B. (11) B. (12) C. (13) B. (14) A.

(15) A pressure regulator controls the pressure in the spray system and therefore the amount of spray material delivered by the nozzles.

(16) C. (17) A. (18) B. (19) B. (20) D.

(21) 1. Check the spray system for leaks and drips by filling the tank with water and pressurizing the system.

2. Check the nozzles and strainers, making sure they are all the same type and are clean.

3. Measure the distance between the nozzle tip and the target and adjust, if necessary.

(22) B. (23) C. (24) B.

(25) Global positioning systems and geographical information systems help map fields and increase the accuracy of pesticide applications.

Chapter 4 Calibration

(1) Calibration of various systems is important because each system is a unique combination of pumps, nozzles, and other equipment.

(2) A. (3) B. (4) C. (5) C. (6) B. (7) D.

(8) A. (9) C. (10) B. (11) A. (12) A.

(13) D. (14) D. (15) B. (16) C. (17) A. (18) C.

Chapter 5 Insect Management

(1) D. (2) A.

(3) Metamorphosis is defined as the change in shape or form of an animal. An insect is said to undergo metamorphosis when it changes from the larval to pupal to adult life stage.

(4) A. (5) A. (6) C. (7) B. (8) B. (9) C.

(10) B.

(11) It is important to understand an insect's life cycle for pest management because each life stage is managed differently on the basis of its food source and habitat.

(12) B. (13) D. (14) E. (15) A. (16) C. (17) B.

(18) E. (19) B. (20) C. (21) C. (22) D. (23) B.

(24) A. (25) C. (26) A. (27) C. (28) B. (29) C.

(30) A. (31) D. (32) B. (33) A. (34) B. (35) A.

Chapter 6 Weed Management

(1) A weed is a plant growing where it is not wanted.

(2) B. (3) B. (4) C. (5) D. (6) A. (7) B.

(8) A. (9) A.

(10) Advantages –spot treatment, treat after problem occurs, herbicide is less susceptible to environmental conditions after treatment.

Disadvantages—need to correctly identify the weed, timing of application is critical, should not be applied to wet foliage, weather may not permit a timely application.

(11) B. (12) A. (13) B. (14) A.

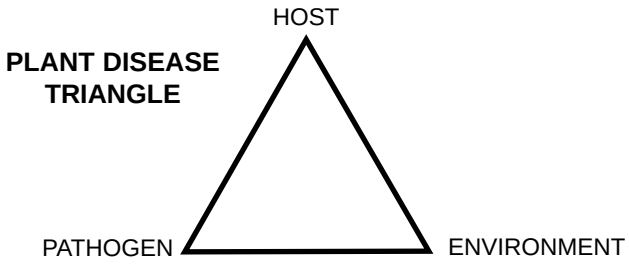
(15) A herbicide adjuvant is any substance that is added to a herbicide to enhance its effectiveness.

(16) B.

Chapter 7 Disease Management

(1) A. (2) C. (3) A. (4) C. (5) C.

(6)



(7) A.

(8) 1. Production of inoculum.

3. Spread of inoculum.

4. Infection.

5. Pathogen survival between susceptible crops.

(9) B. (10) C. (11) C. (12) D. (13) B. (14) B.

(15) C. (16) B. (17) A. (18) C. (19) D. (20) D.

(21) B. (22) A. (23) B. (24) C. (25) A. (26) B.

(27) C. (28) C. (29) A. (30) A. (31) A. (32) B.

(33) B.

(34) Any three of the following five are correct.

1. Plant high-yielding and resistant varies.
2. Plant more than one variety.
3. Treat all seeds before planting.
4. Scout fields to identify fields with potential problems.
5. Protect the flag leaf.

Chapter 8 Nematode Management

(1) A. (2) D. (3) B. (4) D. (5) C.

(6) Prevention tactics—example: crop rotation; using nematode-free seeds and transplants; planting nematode-resistant varieties; keeping farm equipment nematode free; maintaining good farm sanitation.

Containment tactics—keep nematode populations from moving to new fields or other areas of a field—example: practice prevention tactics such as crop rotation and planting nematode-free seeds and transplants to reduce nematode population.

Chemical control tactics—the application of nematicides—example: fumigant and non-fumigant nematicides applied to the soil.

(7) B. (8) B. (9) D. (10) A. (11) C. (12) C.

(13) B. (14) C.

(15) A cyst is the body of a dead adult female nematode of the genus Heterodera or Globodera, which may contain eggs.

APPENDIX B

CONVERSION TABLES

Area

144 square inches . . . . . .1 square foot
9 square feet . . . . . .1 square yard
43,560 square feet . . . . . .1 acre
4,840 square yards . . . . . .1 acre
160 square rods . . . . . .1 acre
640 acres . . . . . .1 square mile
2.5 acres . . . . . .1 hectare

Length

1 inch . . . . . 2.54 centimeters . . . . . .5.5 millimeters
1 foot . . . . . .12 inches
1 yard . . . . . .3 feet
1 rod . . . . . 5.5 yards . . . . . .16.5 feet
1 mile . . . . . 320 rods . . . . . 1,760 yards . . . . . .5,280 feet
1 meter . . . . . 39.4 inches . . . . . .1.09 yards
1 kilometer . . . . . 1,000 meters . . . . . .0.62 miles

Volume

1 tablespoon (tbsp or T) . . . . . .3 teaspoons (tsp or t)
1 fluid ounce . . . . . .2 tablespoons
8 fluid ounces . . . . . 16 tablespoons . . . . . .1 cup
16 fluid ounces . . . . . 2 cups . . . . . .1 pint
32 fluid ounces . . . . . 4 cups . . . . . .1 quart
128 fluid ounces . . . . . 4 quarts . . . . . .1 gallon
1 liter . . . . . 33.9 ounces . . . . . .1.06 quarts

Weight

1 ounce . . . . . .28.3 grams
1 pound . . . . . 16 ounces . . . . . .453.6 grams
2.2 pounds . . . . . 1 kilogram . . . . . .1,000 grams
1 ton . . . . . 2,000 pounds . . . . . .907 kilograms
1 metric ton . . . . . 1,000 kilograms . . . . . .2,205 pounds

APPENDIX C

GLOSSARY

ABDOMINAL PROLEGS—The false, peglike legs on the abdomen of a caterpillar.

ABSORPTION—The movement of a chemical into plants, animals (including humans), and/or microorganisms.

ACARICIDE—A pesticide used to control mites and ticks. A miticide is an acaricide.

ACTIVE INGREDIENT—The chemical or chemicals in a pesticide responsible for killing, poisoning, or repelling the pest. Listed separately in the ingredient statement on the pesticide label.

ACTION THRESHOLD—See ***economic threshold***

ACUTE TOXICITY—The capacity of a pesticide to cause injury within 24 hours following exposure. LD_{50} and LC_{50} are common indicators of the degree of acute toxicity. (See also ***chronic toxicity***.)

ADJUVANT—A substance added to a pesticide to improve its effectiveness or safety. Examples: penetrants, spreader-stickers, and wetting agents.

ADSORPTION—The binding of a chemical to a surface by physical or chemical attraction. Clay and high organic soils tend to adsorb pesticides.

AGGREGATION PHEROMONE—See ***pheromone***.

ALLELOPATHY—When one plant species releases toxic chemicals that eliminate a competing species.

ANAL PROLEGS—The false, peglike legs near the anus of a caterpillar.

ANNUAL—A plant that completes its life cycle in one year.

ANTI-SIPHONING DEVICE—A device attached to the filling hose that prevents backflow or back-siphoning from a spray tank into a water source.

ANTIDOTE—A treatment used to counteract the effects of pesticide poisoning or some other poison in the body.

ARACHNID—A wingless arthropod with two body regions and four pairs of jointed legs. Spiders, ticks, and mites are in the class Arachnida.

ARTHROPOD—An invertebrate animal characterized by a jointed body and limbs and usually a hard body covering that is molted at intervals. For example, insects, mites, and crayfish are in the phylum Arthropoda.

ATTRACTANT—A substance or device that will lure pests to a trap or poison bait.

AUGMENTATION—A periodic release of natural enemies to increase the present population; a method of biological control.

BACK-SIPHONING—The movement of liquid pesticide mixture back through the filling hose and into the water source.

BACTERIA (Bacterium)—Microscopic organisms, some of which are capable of producing diseases in plants and animals. Others are beneficial, killing pests.

BACTERICIDE—Chemical used to control bacteria.

BAIT—A food or other substance used to attract a pest to a pesticide or to a trap.

BAND APPLICATION—The application of a pesticide in a strip or band of a certain width.

BENEFICIAL INSECT—An insect that is useful or helpful to humans; usually insect parasites, predators, pollinators, etc.

BIENNIAL—A plant that requires two growing seasons to complete its life cycle.

BIOLOGICAL CONTROL—Control of pests using predators, parasitoids, and disease-causing organisms. May be naturally occurring or introduced.

BOTANICAL PESTICIDE—A pesticide produced from chemicals found in plants. An example is pyrethrum.

BRAND NAME—The name or designation of a specific pesticide product or device made by a manufacturer or formulator; a marketing or trade name.

BROADCAST APPLICATION—A uniform pesticide application to a field or site.

CALIBRATE, CALIBRATION OF EQUIPMENT—The measurement of dispersal or output and adjustments made to control the rate of dispersal of pesticides.

CARBAMATES (N-methyl carbamates)—A group of pesticides containing nitrogen and used as insecticides, fungicides, and herbicides. The N-methyl carbamates are insecticides and inhibit ***cholinesterase*** in animals.

CARCINOGENIC—The ability of a chemical to induce malignant tumors (cancer).

CARRIER—An inert liquid, solid, or gas added to an active ingredient to make a pesticide dispense effectively. A carrier is also the material, usually water or oil, used to dilute the formulated product for application.

CARRYOVER (HERBICIDE)—When a herbicide is not broken down during the season of application and persists in quantities large enough to injure succeeding crops.

CERTIFIED APPLICATORS—Individuals who are certified to use or supervise the use of any restricted-use pesticide covered by their certification.

CHEMICAL NAME—The scientific name of the active ingredient(s) found in the formulated product. This complex name is derived from the chemical structure of the active ingredient.

CHEMICAL CONTROL—Pesticide application to kill pests.

CHEMTREC—The Chemical Transportation Emergency Center has a toll-free number (800-424-9300) that provides 24-hour information for chemical emergencies such as spills, leaks, fires, or accidents.

CHOLINESTERASE, ACETYLCHOLINESTERASE—An enzyme in animals that helps regulate nerve impulses. This enzyme is inhibited by N-methyl carbamate and organophosphate pesticides.

CHRONIC TOXICITY—The ability of a material to cause injury or illness (beyond 24 hours following exposure) from repeated, prolonged exposure to small amounts of pesticide. (See also ***acute toxicity***.)

COMMERCIAL APPLICATOR—A person applying restricted-use or general-use pesticides as a scheduled or required work assignment, holding out for hire, or advertising the business of applying pesticides.

COMMON NAME—A name given to a pesticide's active ingredient by a recognized committee on pesticide nomenclature. Many pesticides are known by a number of trade or brand names, but each active ingredient has only one recognized common name.

CONCENTRATION—Refers to the amount of active ingredient in a given volume or weight of formulated product.

CONTACT PESTICIDE—A compound that causes death or injury to insects when it touches them. It does not have to be ingested. Often used in reference to a spray applied directly on a pest.

CONTAMINATION—The presence of an unwanted substance (sometimes pesticides) in or on plants, animals, soil, water, air, or structures.

COTYLEDONS—The first leaf or pair of leaves of a seedling.

CROSS-RESISTANCE—When a pest resistant to one type of pesticide is also resistant to other pesticides with a similar mode of action.

CULTURAL CONTROL—A pest control method that includes changing agricultural production practices, such as sanitation, work practices, tillage, crop rotation, etc.

CURATIVE—The application of a control tactic after the pest has arrived.

CYST (NEMATODES)—The body of a dead adult female nematode of the genus *Heterodera* or *Globodera*, which may contain eggs.

DAMPING-OFF—The destruction of seedlings near the soil line, resulting in the seedlings falling to the ground.

DECONTAMINATE—To remove or break down a pesticide from a surface or substance.

DEGRADATION—The process by which a chemical compound or pesticide is reduced to simpler compounds by the action of microorganisms, water, air, sunlight, or other agents. Degradation products are usually but not always less toxic than the original compound.

DEPOSIT—The amount of pesticide on treated surfaces after application.

DERMAL TOXICITY—The ability of a pesticide to cause acute illness or injury to a human or animal when absorbed through the skin. (See ***exposure route***.)

DETOXIFY—To render a pesticide's active ingredient or other poisonous chemical less toxic.

DIAGNOSIS—The positive identification of a problem and its cause.

DILUENT—Any liquid, gas, or solid material used to dilute or weaken a concentrated pesticide.

DISEASE—A disturbance of normal plant function; caused by bacteria, fungi, virus, or environmental conditions.

DISEASE CYCLE—The basic chain of events involved in disease development.

DISINFECTANT—A chemical or other agent that kills or inactivates disease-producing microorganisms.

DOSE, DOSAGE—Quantity, amount, or rate of pesticide applied to a given area or target.

DRIFT—The airborne movement of a pesticide spray or dust beyond the intended target area.

DRIFT MANAGEMENT PLAN—A written plan required of commercial and private applicators by Michigan Regulation 637 whenever there is a chance of a spray application drifting from the target onto non-target and off-site sensitive areas.

DUST—A finely ground, dry pesticide formulation containing a small amount of active ingredient and a large amount of inert carrier or diluent such as clay or talc.

ECONOMIC DAMAGE—The amount of injury that will justify the cost of applied control measures.

ECONOMIC THRESHOLD (ET, ACTION THRESHOLD)—The pest density at which action must be taken to prevent the pest population from causing economic damage.

ECOSYSTEM—The pest management unit. It includes a community (of ***populations***) with the necessary physical and biotic (food, hosts) supporting factors that allow an infestation of pests to persist.

EMULSIFIABLE CONCENTRATE—A pesticide formulation produced by mixing or suspending the active ingredient (the concentrate) and an emulsifying agent in a suitable carrier. When it's added to water, a milky emulsion is formed.

EMULSIFYING AGENT (EMULSIFIER)—A chemical that aids in the suspension of one liquid in another that normally would not mix together.

EMULSION—A mixture of two liquids that are not soluble in each other. One is suspended as very small droplets in the other with the aid of an emulsifying agent.

ENCAPSULATED FORMULATION—A pesticide formulation with the active ingredient enclosed in capsules of polyvinyl or other materials; principally used for slow release.

ENDANGERED SPECIES—A plant or animal species whose population is reduced to the extent that a federal agency has designated it as being in danger of becoming extinct.

ENVIRONMENT—All of our physical, chemical, and biological surroundings, such as climate, soil, water, and air, and all species of plants, animals, and microorganisms.

ENVIRONMENTAL PROTECTION AGENCY OR EPA—The federal agency responsible for ensuring the protection of humans and the environment from potentially adverse effects of pesticides.

EPA ESTABLISHMENT NUMBER—A number assigned to each pesticide production plant by the EPA. The number indicates the plant at which the pesticide product was produced and must appear on all labels of that product.

EPA REGISTRATION NUMBER—An identification number assigned to a pesticide product when the product is registered by the EPA. The number must appear on the label for the product.

ERADICATION—The complete elimination of a (pest) population from a designated area.

EXOSKELETON—The external hardened covering or skeleton of an insect; periodically shed.

EXPOSURE ROUTE OR COMMON EXPOSURE ROUTE—The manner (dermal, oral, or inhalation / respiratory) by which a pesticide may enter an organism.

FIFRA—The Federal Insecticide, Fungicide, and Rodenticide Act; a federal law and its amendments that regulate pesticide registration and use.

FLOWABLE—A pesticide formulation in which a very finely ground solid particle is suspended (not dissolved) in a liquid carrier.

FOOD TOLERANCE—The host's ability to withstand pest injury.

FORMULATION—The pesticide product as purchased, containing a mixture of one or more active ingredients, carriers (inert ingredients), and other additives making it easy to store, dilute, and apply.

FRUITING BODY—The part of a fungus that contains spores.

FUMIGANT—A pesticide formulation that volatilizes, forming a toxic vapor or gas that kills in the gaseous state. It usually penetrates voids to kill pests.

FUNGICIDE—A chemical used to control fungi.

FUNGUS (plural: fungi)—A group of small, often microscopic organisms in the plant kingdom that cause rot, mold, and disease. Fungi need moisture or a damp environment (wood rots require at least 19 percent moisture).

GENERAL-USE PESTICIDE—A pesticide that can be purchased and used by the general public. (See also restricted-use pesticide.)

GEOGRAPHIC INFORMATION SYSTEM (GIS)—An organized collection of computer hardware, software, geographic data, and personnel designed to capture, manipulate, analyze, and display geographically referenced data.

GLOBAL POSITIONING SYSTEM (GPS)—A portable, satellite-based system that will establish the real-world location (position) of the GPS receiver.

GRANULE—A dry pesticide formulation. The active ingredient is either mixed with or coated onto an inert carrier to form a small, ready-to-use, low-concentrate particle that normally does not present a drift hazard. Pellets differ from granules only in their precise uniformity, larger size, and shape.

GROUNDWATER—Water sources located beneath the soil surface from which spring water, well water, etc., are obtained. (See also ***surface water***.)

HAZARD—See ***risk***.

HERBICIDE—A pesticide used to kill plants or inhibit plant growth.

HOPPERBURN—A V-shaped yellow marking resulting from feeding of potato leafhopper.

HOST—Any animal or plant on or in which another lives for nourishment, development, or protection.

HOST RESISTANCE—The defense mechanism of an animal or plant against a pest; sometimes host-plant resistance. (See ***resistance***.)

HYPHA (plural: hyphae)—A single, delicate, threadlike structure of fungus.

IGR, INSECT GROWTH REGULATOR—A pesticide that mimics insect hormones that control molting and the development of some insect systems affecting the change from immature to adult. (See ***juvenile hormone***.)

INCUBATION PERIOD—The time between first exposure to a pathogen and first appearance of symptoms.

INERT INGREDIENT—In a pesticide formulation, an inactive material without pesticidal activity.

INFECTION—The establishment of a pathogen with a host.

INFECTIOUS DISEASE—Disease caused by pathogens such as bacteria, viruses, and fungi; can be spread from plant to plant.

INGREDIENT STATEMENT—The portion of the label on a pesticide container that gives the name and amount of each active ingredient and the total amount of inert ingredients in the formulation.

INHALATION—Taking a substance in through the lungs; breathing in. (See ***exposure route***.)

INOCULUM—A pathogen source that can infect and cause disease.

INSECT GROWTH REGULATOR—See ***IGR***.

INSECTICIDE—A pesticide used to manage or prevent damage caused by insects.

INSECTS, INSECTA—A class in the phylum Arthropoda characterized by a body composed of three segments (head, thorax, and abdomen) and three pairs of legs.

INTEGRATED PEST MANAGEMENT——See ***IPM***.

IPM—Integrated pest management. A planned pest control program in which various methods are integrated and used to keep pests from causing economic, health-related, or aesthetic injury. IPM emphasizes reducing pests to a tolerable level. Pesticide application is not the primary control method but is an element of IPM, as are cultural, mechanical, and biological methods. IPM programs emphasize communication, monitoring, inspection, and evaluation (keeping and using records).

JUVENILE—The immature or larval stages of nematodes; commonly referred to as J1, J2, J3, and J4.

JUVENILE HORMONE—A hormone produced by an insect that inhibits change or molting. As long as juvenile hormone is present, the insect remains immature and does not develop into an adult.

LABEL—All printed material attached to or on a pesticide container.

LABELING—The pesticide product label and other accompanying materials that contain directions that pesticide users are legally required to follow.

LARVA (plural: larvae)—An early developmental stage of insects with complete metamorphosis. Insects hatch out of the egg as larvae before becoming pupae (resting stage) and then adults.

LC_{50}—Lethal concentration. The concentration of a pesticide, usually in air or water, that kills 50 percent of a test population of animals. LC_{50} is usually expressed in parts per million (ppm). The lower the LC_{50} value, the more acutely toxic the chemical.

LD_{50}—Lethal dose. The dose or amount of a pesticide that can kill 50 percent of the test animals when eaten or absorbed through the skin. LD_{50} is expressed in milligrams of chemical per kilogram of body weight of the test animal (mg / kg). The lower the LD_{50}, the more acutely toxic the pesticide.

LEACHING—The movement of a substance on water downward through soil.

MESOTHORAX—The second segment of an insect's t***horax***. One pair of legs and usually one pair of wings are attached.

METAMORPHOSIS—A change in the shape, or form, of an animal. Usually refers to insect development.

METATHORAX—The third segment of an insect's ***thorax***. One pair of legs and often one pair of wings are attached.

MICROBIAL DEGRADATION—Breakdown of a chemical by microorganisms.

MICROBIAL PESTICIDE—Bacteria, viruses, fungi, and other microorganisms used to control pests. Also called biorationals.

MICROORGANISM—An organism so small it can be seen only with the aid of a microscope.

MITICIDE—A pesticide used to control mites.

MODE OF ACTION—The way in which a pesticide exerts a toxic effect on the target plant or animal.

MOLLUSCICIDE—A chemical used to control snails and slugs.

MOLT—Periodic shedding of the outer layer of the insect skeleton.

MONITORING—On-going surveillance. Monitoring includes inspection and record keeping. Monitoring records allows technicians to evaluate pest population suppression, identify infested or non-infested sites, and manage the progress of the management or control program.

MYCELIUM—A mass of fungal hyphae; has a fuzzy appearance.

NECROSIS—Death of plant or animal tissues that results in the formation of discolored, sunken, or dead (necrotic) areas.

NEMATODE—A small, slender, colorless roundworm; nematodes live in soil and water or as parasites.

NEMATICIDE—A chemical used to control nematodes.

NON-INFECTIOUS DISEASE—Disease caused by nonliving agents such as drought, soil compaction, temperature or moisture extremes, nutrient deficiency, etc.; can not reproduce and spread.

NON-POINT SOURCE POLLUTION—Pollution from a generalized area or weather event.

NON-TARGET ORGANISM—Any plant or animal other than the intended target(s) of a pesticide application.

NOZZLE FLOW RATE—The amount of material that passes through the nozzle in a specific amount of time; depends on pressure and tip size.

NYMPH—The immature stage of insects with gradual metamorphosis. Nymphs become adults.

ORAL TOXICITY—The ability of a pesticide to cause injury or acute illness when taken by mouth. One of the common exposure routes.

ORGANOPHOSPHATES—A large group of pesticides that contain the element phosphorus and inhibit ***cholinesterase*** in animals.

PARASITOID—An organism that lives during its development in or on the body of a single host organism, eventually killing it.

PATHOGEN—A disease-causing organism.

PERENNIAL—A plant that lives for more than two years.

PERSONAL PROTECTIVE EQUIPMENT (PPE)—Devices and clothing intended to protect a person from exposure to pesticides. Includes such items as long-sleeved shirts, long trousers, coveralls, suitable hats, gloves, shoes, respirators, and other safety items as needed.

PEST—An undesirable organism (plant, animal, bacterium, etc.); any organism that competes with people for food, feed, or fiber, causes structural damage, is a public health concern, reduces aesthetic qualities, or impedes industrial or recreational activities.

PESTICIDE—A chemical or other agent used to kill, repel, or otherwise control pests or to protect from a pest.

PETIOLE—The stalk of a leaf.

pH—A measure of the acidity / alkalinity of a liquid; pH7 is neutral, below pH7 is acid, and above pH7 (up to 14) is basic or alkaline.

PHEROMONE—A substance emitted by an animal to influence the behavior of other animals of the same species. Examples are sex pheromones (to attract mates) and aggregation pheromones (to keep members of the same species together in a group). Some pheromones are synthetically produced for use in insect traps.

PHOTODEGRADATION—Breakdown of chemicals by the action of light.

PHYTOTOXICITY—Injury to plants caused by a chemical or other agent.

POINT OF RUNOFF—The point at which a spray starts to run or drip from the surface to which it is applied.

POINT SOURCE POLLUTION—Pollution from a specific source.

POISON CONTROL CENTER—A local agency, generally a hospital, that has current information on the proper first aid techniques and antidotes for poisoning emergencies. Centers are listed in telephone directories.

POPULATION—Individuals of the same species. The populations in an area make up a community. (See ***ecosystem***.)

POSTEMERGENT HERBICIDE—Herbicide applied after weeds have emerged to kill them by contacting the foliage.

PREEMERGENT HERBICIDE—Herbicide applied before emergence of weeds to kill them as they develop (sprout).

PREHARVEST INTERVAL—The minimum amount of time in days between the last application and harvest. The preharvest interval can be found on the pesticide label.

PRECIPITATE—A solid substance that forms in a liquid and settles to the bottom of a container; a material that no longer remains in suspension.

PREDATOR—An animal that attacks, kills, and feeds on other animals. Examples of predaceous animals are hawks, owls, snakes, and many insects.

PRONOTUM—The area just behind an insect's head (i.e., the upper plate of the ***prothorax***).

PROTECTANT—A chemical applied to a plant or animal to prevent a pest problem.

PROTHORAX—The first segment of an insect's ***thorax***. One pair of legs is attached.

PUPA (plural: pupae)—The developmental (resting) stage of insects with complete metamorphosis, when major changes from the larval to the adult form occur.

RATE OF APPLICATION—The amount of pesticide applied to a plant, animal, unit area, or surface; usually measured as per acre, per 1,000 square feet, per linear foot, or per cubic foot.

REENTRY INTERVAL (REI)—The length of time following an application of a pesticide when entry into the treated area is restricted.

REGISTERED PESTICIDES—Pesticide products that have been registered by the Environmental Protection Agency for the uses listed on the label.

REPELLENT—A compound that keeps insects, rodents, birds, or other pests away from humans, plants, domestic animals, buildings, or other treated areas.

RESIDUAL PESTICIDE—A pesticide that continues to remain effective on a treated surface or area for an extended period following application.

RESIDUE—The pesticide active ingredient or its breakdown product(s) that remain in or on the target after treatment.

RESISTANCE—The inherited ability of a pest to tolerate the toxic effects of a particular pesticide.

RESTRICTED-USE PESTICIDE—A pesticide that can be purchased and used only by certified applicators or persons under their direct supervision. A pesticide classified for restricted use under FIFRA, Section 3(d)(1)(C).

RHIZOME—An underground stem capable of sending out roots and leafy shoots.

RISK—A probability that a given pesticide will have an adverse effect on humans or the environment in a given situation.

RODENTICIDE—A pesticide used to control rodents.

RUNOFF—The movement of water and associated materials on the soil surface. Runoff usually proceeds to bodies of surface water.

SANITATION—The removal of infected plant parts, decontamination of tools, equipment, hands, etc.

SCLEROTIA—A mass of hyphae and food that allows the fungus to survive long periods of extreme hot or cold temperatures and lack of water.

SCOUTING—Regular monitoring of a crop or site to determine possible pest problems.

SCUTUM—Shieldlike structure located near the front part of the ***mesothorax*** of an insect.

SIGNAL WORDS—Required word(s) that appear on every pesticide label to denote the relative toxicity of the product. Signal words are DANGER-POISON, DANGER, WARNING, and CAUTION.

SITE—Areas of pest infestation. Each site should be treated specifically or individually.

SOIL DRENCH—To soak or wet the ground surface with a pesticide. Large volumes of the pesticide mixture are usually needed to saturate the soil to any depth.

SOIL FUMIGANT—A toxic gas or volatile substance that is used to kill soil microorganisms.

SOIL INJECTION—The placement of a pesticide below the surface of the soil; common application method for nematicides.

SOIL INCORPORATION—The mechanical mixing of a pesticide product with soil.

SOLUTION—A mixture of one or more substances in another substance (usually a liquid) in which all the ingredients are completely dissolved. Example: sugar in water.

SOLVENT—A liquid that will dissolve another substance (solid, liquid, or gas) to form a solution.

SPECIES—See ***taxonomy***.

SPORE—The reproductive stage of fungi.

SPRAY DRIFT—Movement of airborne spray from the intended area of application.

STOMACH POISON—A pesticide that must be eaten by a pest to be effective; it will not kill on contact.

STOLONS—An aboveground creeping stem that can root and develop new shoots.

STYLET—A long, slender, hollow feeding structure of nematodes and some insects.

SUPPLEMENTAL LABELING—Pesticide label information that appears on a separate piece of paper and contains information on the site, pest, rate, etc. Supplemental labeling may be supplied at the time of purchase or requested from the dealer.

SURFACE WATER—Water on the earth's surface: rivers, lakes, ponds, streams, etc. (See also ***groundwater***.)

SUSPENSION—Pesticide mixtures consisting of fine particles dispersed or floating in a liquid, usually water or oil. Example: wettable powders in water.

TARGET—The plants, animals, structures, areas, or pests at which the pesticide or other control method is directed.

TAXONOMY—The classification of living organisms into groups: kingdom, phylum, class, order, family, genus, and species.

TECHNICAL MATERIAL—The pesticide active ingredient in pure form as it is manufactured by a chemical company. It is combined with inert ingredients or additives in formulations such as wettable powders, dusts, emulsifiable concentrates, or granules.

THORAX—The middle part of an insect's body between the head and the abdomen. It is divided into three segments—***prothorax***, ***mesothorax***, and ***metathorax***. A pair of legs is attached to each thoracic region.

THRESHOLD—A level of pest density at which the pest or its damage becomes unacceptable and control measures are required.

TOXIC—Poisonous to living organisms.

TOXICANT—A poisonous substance such as the active ingredient in a pesticide formulation.

TOXICITY—The ability of a pesticide to cause harmful, acute, delayed, or allergic effects. The degree or extent to which a chemical or substance is poisonous.

TOXIN—A naturally occurring poison produced by plants, animals, or microorganisms. Examples: toxic saliva of potato leafhoppers, vomitoxin produced by the fungus *Fusarium graminearum*.

USE—The performance of pesticide-related activities requiring certification include: application, mixing, loading, transport, storage, or handling after the manufacturing seal is broken; care and maintenance of application and handling equipment; and disposal of pesticides and their containers in accordance with label requirements. Uses not needing certification are long-distance transport, long-term storage, and ultimate disposal.

VAPOR PRESSURE—The property that causes a chemical to evaporate. The higher the vapor pressure, the more volatile the chemical (the easier it will evaporate).

VECTOR—A carrier; an animal (e.g., insect, nematode, mite) that can carry and transmit a pathogen from one host to another.

VERTEBRATE—Animal characterized by a segmented backbone or spinal column.

VIRUS—Ultramicroscopic parasites composed of proteins. Viruses can multiply only in living tissues and cause many animal and plant diseases.

VOLATILITY—The degree to which a substance changes from a liquid or solid state to a gas at ordinary temperatures when exposed to air.

VOMITOXIN—A toxin produced by the fungus Fusarium graminearum (wheat scab) that contaminates wheat; toxic to mammals.

WATER TABLE—The upper level of the water-saturated zone in the ground.

WETTABLE POWDER—A dry pesticide formulation in powder form that forms a suspension when added to water.

For the further definition of terms, consult:

Pesticide Applicator Core Training Manual, E-2195, Michigan State University Extension.

The Federal Insecticide, Fungicide, and Rodenticide Act as amended. Public Law 92-516 October 21, 1972, as amended by Public Law 94-140 November 28, 1975, and Public Law 95-396 September 30, 1978.

Federal Register, November 7, 1990, Part II Environmental Protection Agency 40, CFR Part 171 Certification of Pesticide Applicator; Proposed Rule.

Region V Office of the EPA, Chicago, Ill.

Michigan Department of Agriculture State Plan for Commercial and Private Applicators.

Federal agency secretary's office (for federal employees using restricted pesticides in performance of official duties).

Local, state, and national pest control associations.

APPENDIX D

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Internet Reference Sites

Michigan State University Pesticide Education Program: <http://www.pested.msu.edu/>.

Michigan Department of Agriculture: <http://www.mda.state.mi.us/>.

National Pesticide Telecommunication Network: <http://ace.orst.edu/info/nptn/tech.htm> (pesticide information)

The Extension Toxicology Network: <http://ace.ace.orst.edu/info/extoxnet/> (pesticide information)

Environmental Protection Agency (EPA): <http://www.epa.gov/>.

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USDA Office of Pest Management Policy & Pesticide Impact Assessment Program: <http://ipmwww.ncsu.edu/opmppiap/proindex.htm> (crop profiles).

Notes

PESTICIDE EMERGENCY INFORMATION

For any type of an emergency involving a pesticide, immediately contact the following emergency information centers for assistance.

Current as of March 2001

Human Pesticide Poisoning

POISON CONTROL

From anywhere in the United States, call

1-800-222-1222

Special Pesticide Emergencies

Animal Poisoning

Your veterinarian:

_____
Phone No.

or

Animal Health Diagnostic Laboratory (Toxicology) Michigan State University:

(517) 355-0281

Pesticide Fire

Local fire department:

_____
Phone No.

and

Fire Marshal Division, Michigan State Police:
M – F: 8 –12, 1– 5

(517) 322-1924

Traffic Accident

Local police department or sheriff's department:

_____
Phone No.

and

Operations Division, Michigan State Police:

**(517) 336-6605*

***** *Telephone Number Operated 24 Hours*

Environmental Pollution

District Michigan Department of Environmental Quality (MDEQ) Office Phone No.

_____
Phone No.

and

MDEQ Pollution Emergency Alerting System (PEAS):

**1-800-292-4706*
also
**1-800-405-0101*
Michigan Department of Agriculture Spill Response

Pesticide Disposal Information

Michigan Clean Sweep, Michigan Department of Agriculture Environmental Stewardship Division.
Monday – Friday: 8 a.m.–5 p.m.
(517) 335-6529

National Pesticide Telecommunications Network

Provides advice on recognizing and managing pesticide poisoning, toxicology, general pesticide information and emergency response assistance. Funded by EPA, based at Oregon State University
7 days a week; excluding holidays
6:30 a.m. – 4:30 p.m. **Pacific Time Zone**
1-800-858-7378
FAX: 1-541-737-0761

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