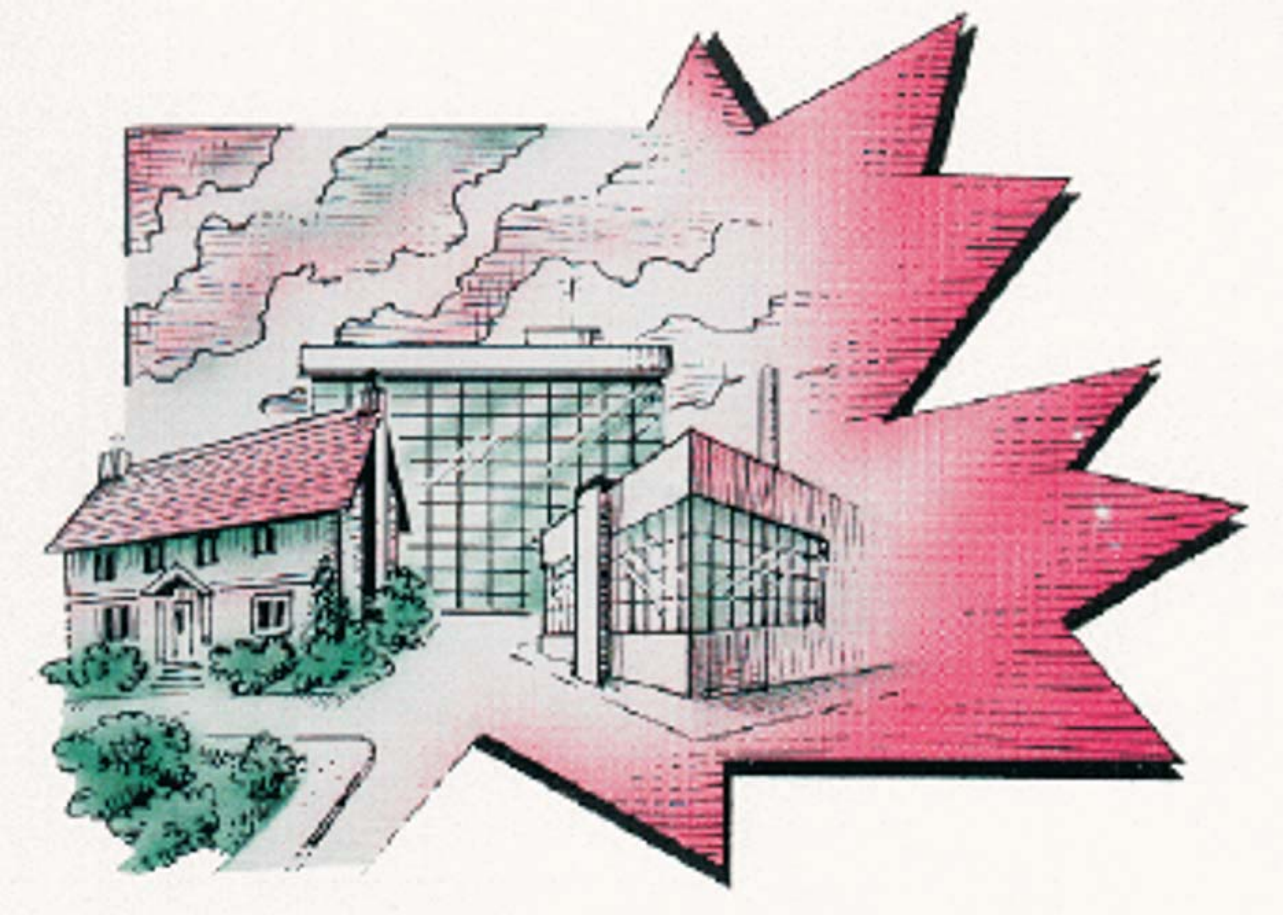

STRUCTURAL MODULE

BASIC KNOWLEDGE REQUIREMENTS FOR PESTICIDE EDUCATION IN CANADA

Federal/Provincial/Territorial Committee
on Pest Management and Pesticides

Edition 2005

Health Canada
Pest Management Regulatory Agency

STRUCTURAL MODULE

BASIC KNOWLEDGE REQUIREMENTS

FOR

PESTICIDE EDUCATION IN CANADA

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Prepared by the Working Group on Pesticide Education, Training and Certification

Edition 2005

The Standard for Pesticide Education, Training and Certification in Canada is posted on the Pest Management Regulatory Agency's website at:

www.pmra-arla.gc.ca/english/pdf/edu/edu_structur-e.pdf

If you would like additional information on the Standard for Pesticide Education, Training and Certification in Canada, please contact:

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Edition 2005 of the Structural Module was developed by the Working Group on Pesticide Education, Training and Certification of the Federal/Provincial/Territorial Committee on Pest Management and Pesticides. It is the second edition of the Structural Module and is an update of the original 1995 edition.

Edition 2005 of the Structural Module, was coordinated by Robert Adams, Environmental Management Branch, BC Ministry of Water, Land and Air Protection.

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Edition 1995 was developed by the National Task Force on Pesticide Education, Training and Certification of the Canadian Association of Pest Control Officials. This Task Force was re-formed as the Working Group on Pesticide Education, Training and Certification in 1996.

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DIRECTIONS FOR USE OF THE STRUCTURAL MODULE:

The Structural Module is organized into ten concepts. They are:

1. General Information
2. Regulations
3. Labeling
4. Human Health
5. Pesticide Safety
6. Environment
7. Pest Management
8. Application Technology
9. Emergency Response
10. Professionalism

Each concept is written in a three column format: Course Outline, Instructional Objectives and Learning Outcomes. The Course Outline contains the information the applicator must know, the Instructional Objectives are what the instructor must ensure the applicator learns, and the Learning Outcomes are what the applicator must be able to do (how their knowledge is measured).

This module is intended to be used as information to develop applicator manuals and training materials. This module along with the Applicator Core is the minimum knowledge requirements for structural applicators in Canada. No attempt has been made to expand concepts or to provide examples (except in cases where those were required to adequately describe a concept). This would be done during the development of training materials.

Trainers developing applicator manuals need to include all the information in this module BUT do not have to maintain the sequence of information indicated in this module or the chapter headings.

Information that is inconsistent or that requires updating should be referred to the Working Group on Pesticide Education, Training and Certification.

Notes in this module are for anyone reading/using the document. The information required in the notes should be incorporated into the training manuals but the notes themselves should not appear in the Training Manuals.

IPM components unique to structural pest management have been described in the module as examples. Manuals should contain applicable examples to further explain the concept of IPM.

BASIC KNOWLEDGE REQUIREMENTS
FOR PESTICIDE EDUCATION IN CANADA
STRUCTURAL MODULE

The Structural Category includes the use of pesticides for the prevention or control of pests that impact a structure or its inhabitants. This category includes:

- control of pests of wood,
- rodent control away from structures,
- vertebrate pest control in and around structures and
- the use of pesticides in and around greenhouses, mushroom houses and barns, except not on plants, crops or animals housed or grown in these structures.

It does not include:

- the use of fumigants other than sulphur bombs,
- the use of herbicides,
- pesticides used in water bodies, or
- control of termites.

The knowledge requirements described in this module are additional to the knowledge requirements detailed in the Applicator Core, common to all certification categories. This module adds details to sections of the Core, where it is necessary to include Structural specific information. An outline of the knowledge requirement for the Structural module is presented on the following page. This outline shows which sections of the Core have been expanded in the module.

The knowledge requirements provided here is the information a trainer would use to provide training to an applicator on the responsible use of pesticides. It is targeted to the trainer for teaching purposes and is not intended as an applicator manual.

In addition to the applicator core, modules have been developed for the following categories:

Aerial
Agriculture
Aquatic Vegetation
Forestry
Fumigation
Greenhouse
Industrial Vegetation
Landscape
Mosquito and Biting Flies
Structural

STRUCTURAL MODULE

CONTENTS

Category: STRUCTURAL

Concept: GENERAL INFORMATION - GROUPING PESTICIDES

General Objectives: To know the general properties of the different chemical groupings in the Structural industry.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Pesticides can be grouped by: - Mode of Action - Target Pest - Chemical Families/Groups The groupings are inter-related and can be used separately or in combination to describe a pesticide (e.g., propoxur is a contact, non-selective, residual Carbamate insecticide).		
Grouping by Mode of Action Common pesticide groupings by mode of action in the Structural category include: 1. by Inherent Properties a. Route of entry - contact or systemic b. Selectivity - selective or non-selective c. Residual Effectiveness - residual or non-residual 2. by Affect on the Pest a. attractant b. chemosterilant c. desiccant d. feeding stimulus e. growth regulators f. repellent g. toxicant (neurotoxin, acute toxicant, anticoagulant, fumigant) See the Pest Management Concept for a definition or description of each Mode of Action relevant to the Structural category.	Know the common modes of action of pesticides used in Structural category.	List the common modes of action of pesticides used in the Structural category.

Category: STRUCTURAL

Concept: GENERAL INFORMATION - GROUPING PESTICIDES

General Objectives: To know the general properties of the different chemical groupings in the Structural industry.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Grouping by Target Pest Common pesticides groupings by target pest in the Structural category include: - Insecticides - Miticides/Acaricide - Rodenticides - Avicides. Consult the Applicator Core for a description of the above pesticides.	Know the types of pesticides by target pest that are used in the Structural category.	List the types of pesticides by target pest that are used in the Structural category.
Grouping by Chemical Family/Groups The target pest grouping can be further subdivided into chemical families/groups.		
The common chemical families/groups used to treat insects and other arthropod pests in the Structural category include: - Carbamate family (Group 1A) – Contact and systemic insecticides that have short residual activity and inhibit cholinesterase activity. Examples include carbaryl and propoxur; - Organophosphate family (Group 1B) – Contact and systemic insecticides that inhibit cholinesterase activity and where most have a short residual activity. Examples include dimethoate and, malathion; - Pyrethroids family (Group 3) – Botanical insecticides or synthetic analogues of botanical insecticides that stimulate repetitive nervous discharges and have a wide range of knockdown and killing power. Examples include pyrethrin, permethrin, and resmethrin;	Know the common chemical families used to treat insects and other arthropod pests in the structural category and know the basic differences in how they affect pests.	List the common chemical families used to treat insects and other arthropod pests in the structural category and identify the basic differences in how they affect pests.

Category: STRUCTURAL

Concept: GENERAL INFORMATION - GROUPING PESTICIDES

General Objectives: To know the general properties of the different chemical groupings in the Structural industry.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- Insect growth regulator family (Group 7) – A group of pesticides that mimics juvenile hormone and prevents moulting to adult (e.g., methoprene).		
The common vertebrate pesticide families/groups used in the Structural category include: - **Chemosterilants** that reduce bird and rat populations by inhibiting reproduction (e.g., Azacosterol hydrochloride, alpha-chlorohydrin); - **Avicides** that kill birds by poisoning them (e.g., strychnine); - **Chemical repellents** that may be non-poisonous (e.g., sticky pastes) or poisonous to birds, rodents and other animals. Non-poisonous repellents are put on exterior ledges, windowsills, beams and places where birds are not wanted. They are sticky and irritating to birds and therefore repel birds. Poisonous repellents (e.g., 4-aminopyridine) make the birds act strange when eaten. The birds' strange behaviour repels other birds; - **Acute rodenticides** that can kill rodents after one exposure (e.g., strychnine, zinc phosphide); - **Anticoagulant rodenticides** that prevent blood from clotting after they are eaten. They can be single-dose rodenticides (e.g., brodifacoum, bromadiolone) that require only one feeding or multiple-dose rodenticides (e.g., chlorophacinone, warfarin) that require several feedings over several days;	Know the common vertebrate pesticide families used in the Structural category and know the basic differences in how they affect pests.	List the common vertebrate pesticide families used in the Structural category and identify the basic differences in how they affect pests.

Category: STRUCTURAL

Concept: GENERAL INFORMATION - GROUPING PESTICIDES

General Objectives: To know the general properties of the different chemical groupings in the Structural industry.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- **Fume rodenticides** produce toxic fumes (e.g., sulphur oxides) when the container is ignited. The fumes are released in burrows to kill burrowing rodents.		
Other references on chemical families/groups may be indicated: - On the pesticide label; - Government publications; - Industry or association publications; - Manufacturer publications; - Educational institutes.	Know where to find other references to chemical families/groups.	Identify where to find other references to chemical families/groups.
NOTE: The chemical families/groups identified above (except for vertebrate pesticides) have been taken from the Pest Management Regulatory Agency (PMRA) Regulatory Directive 99-06.		
Chemical Additives Chemical additives used in the structural category include: - Aromatic Hydrocarbons; - Petroleum Distillates; - Other Petroleum Products; - Polymerized Butenes (sticky pastes).	Know the common additives used in the Structural category.	List the common additives used in the Structural category.
The chemical additive(s) included in a pesticide formulation will be indicated in the Material Safety Data Sheet.	Know where to find information about the chemical additives in a pesticide formulation.	Identify where to find information about the chemical additives in a pesticide formulation.
These additives are sometimes included in a formulated pesticide product, they may be included as part of several pesticides packaged together and intended to be used together or they may be	Know the effects of additives.	Describe the effects of additives.

Category: STRUCTURAL

Concept: GENERAL INFORMATION - GROUPING PESTICIDES

General Objectives: To know the general properties of the different chemical groupings in the Structural industry.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
purchased separately. Their effects may include: - making the pesticide more effective, extending or increasing storage stability and/or handling of the pesticide; - increasing the toxicity and flammability of a pesticide product.		
The label will indicate the effect of the chemical additive. For example, if the additive makes the product flammable or toxic, a warning sign will be included on the label. If the additive requires specialized medical treatment upon exposure, that information will be contained in the Toxicological Information and/or First Aid sections of the label.	Know where to find information about the effect of the chemical additive.	Identify where to find information about the effect of the chemical additive.
Some additives have pesticidal properties and so are registered as pesticides, including: - butenes (sticky pastes) that are repellents (bird and rodent).	Understand that some additives have pesticidal properties.	Identify additives that have pesticidal properties.
NOTE: The active ingredient examples provided in this module are meant to assist course designers and trainers with development of student manuals. The examples were current at the time of writing and are not all-inclusive.		

Category: STRUCTURAL

Concept: REGULATIONS

General Objectives: To understand pesticide regulations for structural applications in Canada.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Provincial and Municipal Regulations Provinces and municipalities may have regulations that deal specifically with structural application. These regulations may include public notification requirements. Structural applicators should check local bylaws regarding pesticide applications in cities or municipalities.	Be aware that provinces and municipalities may have additional regulations regarding structural pest management.	Identify the provincial and/or municipal laws that affect structural application in your community.

Category: STRUCTURAL

Concept: LABELLING

General Objectives: To identify, define and be able to use information on pesticide labels for structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Pesticide Labels for Structural Pests Pesticides used in structural pest management must be specifically registered for use in, on, or around structures. These products can only be applied in those types of locations specified on the label. A specific application method and rate may be stipulated for a particular pest. Labels may include statements to "keep out of areas accessible to children and pets" or "place in tamper-resistant bait stations". Most accidental poisonings from rodenticide baits result because they are too accessible to children or non-target pests.	Know what to look for on a label that allows structural use and give examples of label statements.	Describe the type of information on a pesticide label that indicates it allows structural use.
A registered pesticide can only be used in meat packaging or food processing plants if it contains a cautionary statement specific to these two use locations, and it must also be included in the Reference Listing of the Canadian Food Inspection Agency (CFIA).	Know the requirement for using a registered pesticide in a meat packaging or food processing plant.	Identify the requirement for using a registered pesticide in a meat packaging or food processing plant.
The label gives specific safety precautions and application procedures to be followed during fogging and ultra-low dosage (ULD) applications in buildings. Avicides and acute rodenticides also have label restrictions on their use and disposal.	Know the types of pesticide applications that have specific label requirements on their use.	Identify the types of pesticide applications that have specific label requirements on their use.

Category: STRUCTURAL

Concept: HUMAN HEALTH

General Objective: To understand toxicity factors that affect and/or reduce exposure and risk.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Medical Fitness All individuals handling or using pesticides should have regular medical examinations and identify the nature of their work to their physician (i.e., pesticides and application method being used and personal protective equipment to be worn). This will enable the physician to assess the individual's "fitness" to perform the work.	Know why individuals handling or using pesticides should have a regular medical examination.	Identify why individuals handling or using pesticides should have a regular medical examination.
Some medical conditions may preclude the ability to safely perform pesticide applications including: - respiratory or heart disease that may preclude the use of respiratory protection; - low levels of cholinesterase may preclude use of organophosphate or carbamate pesticides.		
Medical conditions that preclude or require restrictions on the handling or use of pesticides should be brought to the attention of the employer and/or supervisor.	Know whom to report medical conditions that preclude or require restrictions on the handling or use of pesticides.	Identify whom to report medical conditions that preclude or require restrictions on the handling or use of pesticides.
Cholinesterase Testing Organophosphate and many carbamate pesticides inhibit cholinesterase. A pesticide's potential to inhibit cholinesterase is indicated on the label, usually under the Toxicological Information section.	Know the pesticide families/groups that inhibit cholinesterase. Know where to find information on a pesticide's potential to inhibit cholinesterase.	List the pesticide families/groups that inhibit cholinesterase. Identify where to find information on a pesticide's potential to inhibit cholinesterase.
Cholinesterase is an enzyme in the blood that affects the nervous system and the way the brain sends messages to different parts of the body. When cholinesterase is unable to perform its normal function, the nerves in the body continue to send messages to the muscles causing muscle "tremors" or "fibrillations" to occur and can lead to seizures or convulsions. Quick medical treatment is required in cases of organophosphate or carbamate poisoning.	Know what cholinesterase does in the body.	Describe cholinesterase.
	Understand the symptoms of cholinesterase inhibition.	Describe the symptoms of cholinesterase inhibition.

Category: STRUCTURAL

Concept: HUMAN HEALTH

General Objective: To understand toxicity factors that affect and/or reduce exposure and risk.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Many pesticides in this group are highly toxic and are readily absorbed through the skin, lungs or digestive tract. Even the least toxic of this group is easily capable of poisoning humans when used improperly. Symptoms of acute poisoning occur during exposure or usually within 12 hours of contact.	Know when symptoms of acute poisoning from organophosphate or carbamate pesticides usually occurs.	Identify when symptoms of acute poisoning from organophosphate or carbamate pesticides usually occurs.
In general, mild exposure to these pesticides at infrequent intervals is unlikely to produce toxic effects. However, there is a danger from repeated small exposures, as symptoms of poisoning may occur suddenly without warning if cholinesterase levels are not allowed to return to normal. There are usually no serious long-term effects from small exposures, providing renewed exposure is avoided until cholinesterase levels have returned to normal. However, if exposure continues, there may be a potential for long-term health effects.	Know the effects of repeated small exposures to organophosphates and carbamates.	Describe the effects of repeated small exposures.
The symptoms of carbamate poisoning are similar to those caused by the organophosphate pesticides, but of shorter duration.	Know how the symptoms of carbamate poisoning are different than those of organophosphate poisoning.	Compare the symptoms of carbamate poisoning to those of organophosphate poisoning.
Applicators who handle these pesticides on a regular basis should have: 1. A baseline test to determine individual cholinesterase enzyme levels before exposure as they vary between individuals. 2. A regular blood test to check cholinesterase levels during the exposure period. 3. A blood test after accidental exposure.	Know when an applicator should have a cholinesterase test.	Identify when an applicator should have a cholinesterase test.

Category: STRUCTURAL

Concept: HUMAN HEALTH

General Objective: To understand toxicity factors that affect and/or reduce exposure and risk.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Cholinesterase tests should be analyzed by a physician familiar with pesticide exposure and cholinesterase testing.	Know who should analyse the cholinesterase test.	Identify who should analyse the cholinesterase test.
General Pesticide Effects on Human Health General pesticide related effects on human health have been described in the core. Acute toxicity is only one component in determining the overall toxicity of a pesticide. Examples of other components include chronic toxicity, cancer causing affects and ability to cause birth defects. In addition, the health risk of any pesticide is a combination of the overall toxicity and the risk of exposure. The following is a description of how different pesticide groupings may have different levels of acute toxicity.		
Insecticides In general, insecticides tend to have high acute mammalian toxicity and are more toxic to wildlife, fish, bees and other non-target organisms than herbicides or fungicides.	Know that acute toxicity for insecticides is generally high.	Identify that acute toxicity for insecticides is generally high.
Some insecticides families however have only moderate toxicity, such as Pyrethroids (permethrin, pyrethrin, etc.)	Know some category specific examples of chemical families that have moderate or low toxicity.	List category specific examples of chemical families that have moderate or low toxicity.
Some insecticide families have low toxicity including: - Insect growth regulators (methoprene, kinoprene, etc.); - Sorptive dusts (diatomaceous earth, silicone dioxide); - Borates (borax, boric acid);		

Category: STRUCTURAL

Concept: HUMAN HEALTH

General Objective: To understand toxicity factors that affect and/or reduce exposure and risk.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- Mineral oils (dormant or summer oils) and - soaps (insecticidal).		
Rodenticides In general, rodenticides all have very high acute mammalian toxicity and should be used very carefully.	Know that acute mammalian toxicity for rodenticides is generally high.	Identify that the acute mammalian toxicity for rodenticides is generally high.
With all pesticides, applicators should ensure they review the label and identify the toxicity from the warning symbols/specific warnings and identify probability of exposure before use of the pesticide.	Know how to determine toxicity and risk of exposure before using pesticides.	Identify how to determine toxicity and risk of exposure before using pesticides.
Petroleum Products Petroleum products are used as solvents, carriers, and diluents or for their pesticidal properties (e.g., dormant oils). Two types may affect human health: - petroleum distillates; - aromatic hydrocarbons.	Know the types of petroleum products that may affect human health.	List the types of petroleum products that may affect human health.
Petroleum Distillates (e.g., kerosene, mineral oil, diesel oil) may be used as part of the pesticide formulation or as a diluent. They have a wide range of toxicities. Symptoms of acute poisoning may include nausea, vomiting, coughing and irritation to the lungs. This may progress to bronchial pneumonia with fever, weakness, dizziness, slow and shallow respiration, unconsciousness and convulsions. Chronic poisoning may cause weakness, weight loss, anemia, nervousness, and pains in the limbs or peripheral numbness.	Know the symptoms of acute poisoning from petroleum distillates. Know the symptoms of chronic poisoning from petroleum distillates.	List the symptoms of acute poisoning from petroleum distillates. List the symptoms of chronic poisoning from petroleum distillates.

Category: STRUCTURAL

Concept: HUMAN HEALTH

General Objective: To understand toxicity factors that affect and/or reduce exposure and risk.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Aromatic Hydrocarbons (e.g., xylene) may be used as part of the pesticide formulation. They have a wide range of toxicities. Symptoms of acute poisoning may include moderate symptoms such as dizziness, euphoria, headache, nausea, vomiting, tightness in chest and staggering or more severe symptoms such as blurred vision, rapid respiration, paralysis, unconsciousness and convulsions. **NOTE: The active ingredient examples provided in this module are meant to assist course designers and trainers with development of student manuals. The examples were current at the time of writing and are not all-inclusive.**	Know the symptoms of acute poisoning from aromatic hydrocarbons. Know the symptoms of chronic poisoning from aromatic hydrocarbons.	List the symptoms of acute poisoning from aromatic hydrocarbons. List the symptoms of chronic poisoning from aromatic hydrocarbons.

Category: STRUCTURAL

Concept: PESTICIDE SAFETY - APPLICATION

General Objective: To know how to apply pesticides safely during structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
General Safety Procedures for Most Pesticide Applications The following are general safety procedures that should be used for most types of structural pesticide applications:		

1. Applicators must understand how the building ventilation systems work and know how air moves in and out of a building.
- For many dwellings, windows are the only source of ventilation so they should be:
  - closed if cross drafts will cause pesticide drift during application.
  - be opened afterward to adequately vent the building or rooms of pesticide vapours.
- In buildings with sealed ventilation systems, building management staff must be available to shut off exhaust or ventilation fans to prevent pesticides moving through the ventilation system to untreated areas.
	Know how ventilation systems affect applications and how to adequately vent a building following treatments.	Describe how ventilation systems affect applications and how to ensure adequately vent a building following treatments.

2. Spraying ULD fogging or dusting treatments applied in areas where heating systems are located may create a fire hazard. Applicators should ensure that all heating systems that use open flames and/or non grounded fans are shut off to eliminate the fire hazard.	Know that heating systems may cause a fire hazard and what should be done to prevent the hazard.	Describe how heating systems may cause a fire hazard and be able to identify how to prevent the hazard.

Category: STRUCTURAL

Concept: PESTICIDE SAFETY - APPLICATION

General Objective: To know how to apply pesticides safely during structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
3. Before a pesticide is used, notification should be provided to people who may be exposed to the pesticide,. Some provinces or municipalities have specific notification requirements including content of notices, the size of signs and when they are to be posted. In general, a written notice should be given to residents who live in or workers who use areas to be treated. Notices should be posted at entrances to areas that may be entered by people who do not receive a written notice. It should remain posted until the appropriate re-entry time has been reached. Notices should include the treatment date, start time and completion time, re-entry information, a contact person's telephone number for additional information and other appropriate product specific precautions.	Know how to notify building occupants and the public prior to treatments.	Describe how to notify building occupants and the public prior to treatments.
4. Determine and use required and safe re-entry times. The re-entry time is the amount of time that people must stay out of treated areas. The concern over re-entry is the exposure of people to pesticides through: - inhalation or ocular exposure of pesticide vapours, dusts or mists,	Know factors to consider in deciding on safe re-entry times.	Describe factors to consider in deciding on safe re-entry times.

Category: STRUCTURAL

Concept: PESTICIDE SAFETY - APPLICATION

General Objective: To know how to apply pesticides safely during structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- dermal exposure by touching pesticide residues on treated surfaces, or - ingestion when contaminated food has been eaten. Contamination could occur during the application (when unprotected food absorbs pesticides) or contaminated when individuals contact contaminated surfaces with their hands then handle food. Label instructions for re-entry vary. Some give specific times such as no re-entry before 4 hours, some indicate that treated surfaces are not to be contacted until a pesticide spray has dried. Drying time depends on factors such as the amount of ventilation, the temperature and humidity. In cases where re-entry intervals have not been specified on the label, the manufacturer should be contacted to provide re-entry instructions. Ensure also that any requirements or guidelines are followed for re-entry of workers into treated areas set by provincial authorities (e.g., occupational health authorities). Generally re-entry after treatment with any pesticide releasing vapours should only be after substantial ventilation of rooms with fresh air.		
5. Ensure that people are warned to keep themselves and pets away from the treatment area during treatment and for the required re-entry time. Cover aquariums and plants as may be necessary.	Know the responsibility of the applicator to try to keep pets and people away from a treatment area during treatment.	Describe the responsibility of the applicator to try to keep pets and people away from a treatment area during treatment.

Category: STRUCTURAL

Concept: PESTICIDE SAFETY - APPLICATION

General Objective: To know how to apply pesticides safely during structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
6. Ensure doors are locked and/or signs posted to keep people out until re-entry is allowed.		
7. Pesticide sprays must not be mixed in sinks or near floor drains or in carpeted areas, but rather in areas where spills can be contained and cleaned up appropriately.	Know where pesticides should be mixed on site.	Describe where pesticides should be mixed on site.
8. Before treatment with sprays, food (human and pet), children's toys and other personal use items such as clothes, soaps and magazines should be removed from the treatment area.	Know how to remove personal use items from treatment areas.	Describe how to remove personal use items from treatment areas.
9. Whenever possible, pesticides should not be applied directly to food preparation surfaces. If they are sprayed, all food must be removed prior to the application and written notice should be given to residents or staff to clean surfaces with soap and water while wearing chemical resistant gloves, before using again for food preparation.	Know that pesticides should not be applied directly to food preparation surfaces.	Describe precautions for dealing with food preparation surfaces near treatment areas.
10. Follow label precautions for respirators – if not specific, a full face canister respirator should be worn if the applicator is required to enter a spray cloud (instead of avoiding the spray cloud by releasing the spray as the applicator moves toward the exit).	Know precautions for use of respirators.	Describe precautions for use of respirators.
General Safety Procedures for Ultra Low Dose and Fogging Treatments		
1. Exhaust fans must be turned off, and windows and doors closed before treatment.	Know general safety requirements for ULD and fogging treatments.	Describe general safety requirements for ULD and fogging treatments.

Category: STRUCTURAL

Concept: PESTICIDE SAFETY - APPLICATION

General Objective: To know how to apply pesticides safely during structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
2. Applicator exposure should be minimized by starting the treatment at furthest point from planned exit. A full face canister respirator should be worn if it is necessary to enter the spray cloud. 3. Exhaust fans must be turned on and or windows and doors opened to ensure adequate ventilation before re-entry.		
Safety Procedures for Rodent and Bird Baiting 1. Baits must be placed according to label directions in areas inaccessible to humans and other non-target animals, or in tamper-resistant bait stations. They should also be placed in locations where they can be retrieved after the treatment/program is completed. 2. Bait stations should be labelled with words such as “Rodent Bait Station-Do Not Touch” with a contact name and phone number on the container. 3. Baits should be placed so that food and food contacting surfaces will not be contaminated. 4. The number and location of bait points should be recorded for retrieval of baits. 5. Baits should be removed before they become stale (e.g., after 3 - 6 months or when mouldy) or when the baiting program is completed. 6. Dead animals must be removed to prevent risk of secondary poisoning.	Know the safety procedures required for rodent and bird baiting.	List the safety procedures required for rodent and bird baiting.

Category: STRUCTURAL

Concept: PESTICIDE SAFETY - APPLICATION

General Objective: To know how to apply pesticides safely during structural applications.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Safety Precautions for Hand Held Sprayers Hand sprayer use may, without care, expose an applicator to repeated sub-lethal doses of pesticide. The valve trigger may have a tiny leak and if gloves are not also checked for leaks, an applicator's hands may be exposed to spray. Such exposure is of particular concern with organophosphate pesticides. Check the trigger valve and gloves at regular intervals. Routine cholinesterase testing should be done to check whether an applicator has had exposure, if using organophosphates.	Know the importance of routinely inspecting the safe operation of hand sprayers.	Identify the importance of routinely inspecting the safe operation of hand sprayers.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INTEGRATED PEST MANAGEMENT

General Objective: To understand the principles of integrated pest management required to carry out safe and effective pest control.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
IPM for the Structural Category Structural IPM programs differ from IPM programs in other pest management industries in four main ways: 1. Prevention of pest infestations through attention to sanitation and good building maintenance is very effective and should usually be the main objective; 2. Unlike pests outdoors, eradication of some species is desirable and is a realistic goal because the pests are in restricted boundaries; 3. A working knowledge of the structural design, plumbing, electrical and ventilation systems of buildings is essential; 4. Communication with clients is particularly important for establishing tolerances and for educating clients about the IPM approach. Once a problem is under control, the applicator must work with the clients to develop a preventative program.	Know how IPM is unique to the Structural Category.	Describe how IPM is unique to the Structural category.
Putting IPM into Practice When starting to implement IPM, it is often best to set realistic objectives for a small site or for a few types of pests before using IPM on a large scale.	Understand that it is often best to implement IPM for a small site or for a few types of pests before using IPM on a large scale.	Identify how it is best to first implement an IPM program.
Before beginning an IPM program, it is important to collect and analyze information about a management site, including: - physical characteristics of the building or structure;	Know the types of information that should be collected about a management site before developing a pest management plan.	List the types of information that should be collected about a management site before developing a pest management plan.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INTEGRATED PEST MANAGEMENT

General Objective: To understand the principles of integrated pest management required to carry out safe and effective pest control.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- environmental and human health protection concerns including an inventory of plants or animals that require protection; - building use patterns; - past records of pest problems or treatments; - regulatory requirements or bylaws that apply; - treatments that could be used; - financial and other resources available to implement the IPM program.		
When starting an IPM program, a plan should be developed that includes all the IPM elements (prevention, identification, monitoring, injury and action levels, treatments and evaluation). Steps to develop the plan may include: - setting a policy that pests must be correctly identified before action is taken; - choosing suitable monitoring methods and a record keeping system; - setting injury and action thresholds (this may require setting temporary thresholds, if none are available, and determining how to collect data to refine these thresholds); - establishing policies on what treatments will be used; and - developing an evaluation schedule.	Know the key steps for developing an IPM Plan.	List the key steps for developing an IPM Plan.
Revisit the IPM plan at least once a year to make improvements based on the evaluations.	Know how often to revisit the IPM plan.	Identify how often to revisit the IPM plan.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Insects And Other Arthropods Insects are arthropods that (as adults) have jointed bodies, jointed legs and an outer skeleton. The adult insect body has three main sections: head, thorax and abdomen. A pair of antennae is attached to the head. Three pairs of legs and one or two pairs of wings (if present) are attached to the thorax. Insects breathe through spiracles (pores) in their outer skeleton.	Know the general description of an insect	Describe the body parts of an insect.
Other arthropods include mites, ticks, spiders, centipedes, millipedes, sow bugs and pill bugs. All these animals are similar to insects in having jointed bodies, jointed legs and an outer skeleton.	Know how other arthropods are similar to insects.	Describe how other arthropods are similar to insects. List the major differences between them.
Mites have only two main body parts: one consists of only the mouthparts and the other is the fused segments of the body and parallels the head, thorax and the abdomen of insects. After hatching from the egg, the larva has three pairs of legs, whereas the older stages, the nymph and adult stages, have four pairs of legs. Mites do not have wings or antennae.	Know the general description of a mite.	Describe the body parts of a mite.
Spiders also have two main body parts: one consists of the head and thorax and the other is the abdomen. They have four pairs of legs. They do not have wings or antennae.	Know the general description of a spider.	Describe the body parts of a spider.
Centipedes are multi-segmented. There is one pair of legs on each segment. They do not have wings but do have one pair of antennae.	Know the general description of a centipede.	Describe the body parts of a centipede.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Millipedes are multi-segmented. There are two pairs of legs on most segments. They do not have wings but do have one pair of antennae.	Know the general description of a millipede.	Describe the body parts of a millipede.
Sow bugs and pill bugs are very similar. They are multi-segmented and have seven pairs of legs. They do not have wings but do have two pairs of antennae. The main difference is that pill bugs can roll themselves into a ball while sow bugs cannot.	Know the general description of a sow bug and a pill bug.	Describe the body of a sow bug or a pill bug.
	Know the main difference between the two.	Identify the main difference between the two.
There are many different insects and other arthropods. Only a few are pests when they damage property, crops, food, feed, and livestock; and when they carry diseases affecting humans or animals. These pests can vary from province to province.	Know when insects or other arthropods are pests.	Identify when insects or other arthropods are pests.
Insects and other arthropods can do most of their damage with their mouthparts in the course of feeding. The mouthparts of these pests are adapted for one or more of the following: chewing, sucking, siphoning and lapping.	Know how the different type of mouthparts an insect or other arthropod has, will affect the damage done.	List the ways that insects and other arthropods use their mouthparts to feed.
Insect and Mite Life Cycles Insects and other arthropods go through three to five different stages as they grow. The common stages are: egg, nymph, larva, young, pupa, and adult. These stages describe a change in size or form. When an insect changes in form, they are said to undergo metamorphosis.	Know the stages of growth that insects and other arthropods may go through.	Describe the stages that insects and other arthropods may go through.
	Understand the concept of metamorphosis.	Describe metamorphosis.
Insect life cycles are made up of a series of specific stages. Typical insect life cycles include: 1. Egg to young to adult (no metamorphosis). The young look like the adult but are less developed (e.g., silverfish). All life stages live in the same habitat.	Know the typical life cycles of insects.	Describe the typical life cycles of insects.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

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COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
The adult is the reproductive stage. 2. Egg to nymph to adult (gradual or incomplete metamorphosis). A nymph is similar in appearance to the adult but is wingless and lacking reproductive organs. The nymphs moult (shed their exoskeleton) three to five times to attain the size and development of the adult. They have compound eyes and externally developing wings (e.g., aphids and grasshoppers). All stages of the life cycle live in the same habitat. The adult is the reproductive stage. 3. Egg to larva to pupa to adult (complete metamorphosis). The larva is very different from the adult. It is grub-like and feeds extensively (e.g., grubs and maggots). The larva goes through three to five stages (instars) where it sheds its exoskeleton to grow in size. The pupa is a non-feeding stage during which complete change of shape occurs. The adult is the reproductive stage and is usually winged. (e.g., moths, beetles and flies). The larvae and adults may live in different habitats.		
Ticks go through 4 life stages in their life cycle: egg, larva, nymph and adult. The larvae have six legs while the nymphs have 8 legs. The adult is the reproductive stage and all share the same feeding preferences. The larva, nymphs and the adult are all feeding stages. All stages are found in the same habitat.	Know the life cycle of ticks.	Describe the life cycle of ticks.
Mites generally go through five stages in their life cycle: egg, larva, two nymphal stages and adult. The adult is the reproductive stage and all share the same feeding	Know the life cycle of mites.	Describe the life cycle of mites.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
preferences. The larva, nymphs and the adult are all feeding stages. All stages are found in the same habitat.		
The other arthropods (spiders, centipedes, millipedes, sow bugs and pill bugs) go through three stages in their lives: egg to young to adult (no metamorphosis). The young look like the adult but are smaller. All life stages live in the same habitat. The adult is the reproductive stage.	Know the life cycles of spiders, centipedes, millipedes, sow bugs, and pill bugs.	Describe the life cycle of spiders, centipedes, millipedes, sow bugs and pill bugs.
A generation is the completion of all the stages in a particular arthropod's life cycle. Some may have more than one generation per year and may require management at each injurious stage. The number of generations per year is dependent on species and temperature.		
Pest Management Methods for Insects and Other Arthropods The most effective control is usually achieved during the active immature stages (young, nymph, or larva). Adults can also be controlled but to a lesser extent. Most pesticides for insects and other arthropods do not affect eggs and pupae.	Know the life cycle stages of growth during which the best control is usually achieved.	Identify the life cycle stages during which the best control is usually achieved.
Insect and other arthropods should be controlled following an integrated pest management (IPM) approach. Plan the IPM program by considering the pest, the host, predators and parasites, the environment, human and animal safety and the available treatment methods.	Know that control of insects and other arthropods should follow an IPM approach. Know the components of an IPM program to consider for insect and other arthropod control.	Identify that control of insects and other arthropods should follow an IPM approach. List the components of an IPM program that should be considered for insect and other arthropod control.
The components of an IPM program specific to the Structural certification category (prevention, identification, monitoring, injury and action thresholds, treatments and evaluation) are each discussed below.		

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Prevention The aim for structural IPM programs should be prevention. In many cases preventative measures that include barriers, sanitation and environmental modifications can eliminate pest problems or make other controls more effective. Barriers include placing screening over intakes, ventilation grills and drains and sealing cracks and crevices in a structure to prevent insects/mites from entering. Sanitation steps include: removing nesting and hiding sites for pests (e.g., removing vegetation and debris from around buildings), cleaning up spilled food and grease and ensuring garbage containers are pest-proof. Environmental modifications include eliminating water and food sources and altering humidity and temperature conditions. It includes good food storage or warehousing practices such as stock rotation and placement of food products on pallets with perimeter and aisle access. Such procedures limit spreading of pests from infested materials and limit their access to stored foods.	Know ways to prevent pest entry into a structure.	Identify ways to prevent pests from entering into a structure.
Identification Many pest managers collect preserved or dried pest specimens to assist in identification. Assistance in pest identification may also be provided in government or industry publications.	Know ways to identify pests.	Describe ways to identify pests
Monitoring Monitoring consists of regularly scheduled inspections to get an indication of the size, extent and location of a pest	Know when and how to monitor structural pests.	Identify when to monitor for structural pests. Describe how they can be monitored.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
population. Detailed written records should be kept. Inspection of a structure involves searching for evidence of an infestation, such as actual pest sightings, insects' casts, and damage. Monitoring should also note any means of pest harbourage including means of entry into the structure, sources of moisture, food and heat throughout the structure and its heating, plumbing and electrical systems. This is important because pests use these systems as pathways into and through buildings. Obtaining information from those working or living in the structure is also an important part of the inspection.		
Tools required to perform a proper inspection include a flashlight, hand lens, hand tools, collecting vial and sticky traps. A mechanic's mirror is also helpful in some situations. A stethoscope may be useful when searching for carpenter ant nests in a building (you can hear ants chewing on the wood with the stethoscope) Pheromone traps or sticky traps may be used to attract insect/mites and pinpoint areas and levels of infestation.	Know the types of tools used for inspections.	List the types of tools used for inspections.
Injury and Action Thresholds The unacceptable level of injury from a pest can include economic damage, a medical or health hazard, and nuisance or aesthetic impacts.	Know how to set injury and action thresholds in the structural category.	Describe how to set injury and action thresholds in the structural category.
Treatments The following IPM treatment methods (described in the core) should be considered and used (alone or in combination) where appropriate: cultural, biological, physical, mechanical and chemical.		

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Cultural treatments in the structural category include sanitation steps and environmental modifications discussed under prevention.	Know the cultural treatments.	Describe the cultural treatments.
Biological treatments include the use of natural enemies to control pests. There are a few biological controls available for structural pests. Examples include insect parasitic nematodes for flea control (outside buildings) and cockroach infecting fungi.	Know the biological treatments.	Describe the biological treatments.
Physical treatments include using barriers also discussed under prevention. The use of extreme temperatures can also be considered a physical treatment. Holding goods at temperatures below freezing is effective and is used for some stored product pests. Use of heat for insect control is under development.	Know the physical treatments.	Describe the physical treatments.
Mechanical treatments include the use of machines or devices that control pests. These include traps such as electrocuting light traps for flying insects, glueboards or sticky traps for insects/mites. Caution should be used to ensure that electrocuting light traps do not adversely affect beneficials. Vacuum cleaners are important mechanical devices to remove pests such as beetles and ants. Vacuums should be fitted with High Efficiency Particulate Air (HEPA) filters where it is necessary to prevent fine particles from being blown back into the room.	Know the mechanical treatments.	Describe the mechanical treatments.
Chemical treatments include the use of pesticides however; the pesticide **must be** registered for both the pest and the treatment site. Other factors to consider include:	Know the factors to be considered when selecting a pesticide.	List the factors to be considered when selecting a pesticide.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- pesticide formulation; - pesticide's odour; - surface to be treated; - level of pest infestation; and - probability of pesticide exposure for people and pets.		
Some formulations will provide longer residual control than others on certain surface types (e.g., microencapsulated, wettable powder and dust formulations are effective longer on porous surfaces than emulsifiable concentrates). With emulsifiable concentrates, some of the emulsion crystals are absorbed into the porous surface and are unavailable for pickup by crawling insects. Some formulations may damage certain surfaces or materials or may leave visible residues.	Know how residual pesticides may be affected by different surfaces.	Describe how residual pesticides may be affected by different surfaces.
	Know that some pesticides may damage certain materials or leave visible residues.	Identify pesticides that may damage certain materials or leave visible residues.
Low odour liquid products or baits should be considered for situations where odour may be a concern, such as living areas and hospitals.	Know where pesticide odour may be a consideration.	Describe where pesticide odour may be a consideration.
Insect bait formulations would minimize the dispersal of a pesticide and reduce possible exposure for people and animals.	Know how insecticide baits can reduce exposure for people and animals.	Describe how insecticide baits can reduce exposure for people and animals.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Pesticide Groupings Pesticides used for arthropod pests are often grouped according to mode of action.	Know how pesticides used for arthropod pests are grouped.	List the ways that pesticides used for arthropod pests are grouped.
Contact pesticides must contact the pest to be effective. They can be applied to the pest or to the surfaces pests touch. Some contact pesticides have a residual effect and can kill the pest for some time after application.	Understand what a contact pesticide means.	Describe a contact pesticide.
Stomach poisons must be swallowed by the pests to be effective. They are usually applied to the pests' food and taken in with the food. Sometimes stomach poisons are mixed with food to form poisonous bait.	Understand what a stomach poison is.	Describe a stomach poison.
Suffocating pesticides (usually oils) clog the breathing system and can also reduce egg survival.	Understand what a suffocating pesticide is.	Describe a suffocating pesticide.
Insect Growth regulators act like the insect's own growth hormones. They disrupt the normal development of the insect causing it to die before it becomes an adult or before it can reproduce.	Understand what a growth regulator is.	Describe a growth regulator.
Silica dusts or gels kill crawling pests by abrading their bodies. This causes them to dehydrate and die. Contact insecticides/miticides are sometimes mixed with these silica products.	Understand how silica dusts work.	Describe how silica dusts work.
Attractants are pesticides that may attract insects or mites. They may attract female insects/mites for egg laying or attract male insects/mites to sticky traps.	Understand what attractants are.	Describe attractants.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Repellents are pesticides that repel insects/mites and will therefore keep them away from their hosts.	Understand what a repellent is.	Describe a repellent.
Sticky pastes are placed on traps that attract pests. Chemicals or colours are used to attract the arthropods to the trap. The pests get stuck on the paste and die. Sticky pastes are also used as barriers to restrict the movement of crawling pests.	Understand where and how sticky pastes are used.	Describe how sticky pastes are used.
Toxicants are a general term to indicate pesticides that kill and include neurotoxins (organophosphate and carbamates) and toxic smokes or fumes. They affect the pest through a variety of modes of action.	Know what toxicant pesticides refers to.	Describe what toxicant pesticides refers to.
Residual effectiveness - refers to how long the pesticide remains effective after application. Some have a short residual period of only a few hours. Others can have a long residual period of several weeks.	Know to what residual effectiveness refers. Know insecticides and miticides/acaricides that have short and long residual periods.	Describe residual effectiveness. Identify insecticides and miticides/acaricides that have short and long residual periods.
Selectivity - refers to which insects or other arthropods will be affected by the pesticide.	Know to what selectivity refers.	Describe selectivity.
Selective pesticides only control one or a few types of arthropods. They generally do not harm non-target organisms.	Understand selective pesticides.	Describe selective pesticides.
Non-selective pesticides may control all insects, mites or both. They may also harm other non-target organisms. Extra caution should be taken when using these pesticides.	Understand non-selective insecticides pesticides.	Describe non-selective pesticides.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Factors Influencing the Effectiveness of Pesticides used for Arthropods		
Factors that influence the effectiveness of pesticides used for arthropods include timing of application, pest resistance and climate conditions.	Know the factors that affect effectiveness of pesticides used for arthropods.	List the factors that affect effectiveness of pesticides used for arthropods.
Timing of application - arthropods may need to be present or in a susceptible stage of development for a pesticide to be effective. Generally, the younger the pest is, the easier it is to control with contact and stomach poisons.	Understand how timing of application affects pesticide effectiveness.	Describe how timing of application affects pesticide effectiveness.
Resistance - some arthropod pests have developed resistance to specific pesticides or families/groups of pesticides.	Understand how pest resistance affects pesticide effectiveness.	Describe how pest resistance affects pesticide effectiveness.
The development of resistant arthropods can be slowed by: - using a variety of chemical and non-chemical methods; - using a pesticide only when needed; - alternating pesticides from different chemical families/groups; - alternating pesticides from different modes of action; - using registered tank mixes with pesticides from different chemical families/groups.	Know how to slow the development of resistance.	Identify how to slow the development of resistance.
Climate conditions - Extremes of temperature and humidity can adversely affect the effectiveness of pesticides by decreasing arthropod activity or by decreasing the activity of the pesticide.	Understand how climate conditions affect pesticide effectiveness.	Describe how climate conditions affect pesticide effectiveness.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - INSECTS AND OTHER ARTHROPODS

General Objective: To understand pest management principles required to carry out safe and effective pest control of insects and other arthropods.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Evaluation The last step in an IPM program includes reviewing all aspects of the program; evaluating the results and where desired effectiveness has not been achieved, identify changes that can be made to improve the program's effectiveness.	Know the evaluation procedures.	Describe the evaluation procedures.
NOTE: When developing manuals: - **describe the arthropod pests that are a significant problem in the province where the manual will be used;**	Know which arthropods are significant pest problems in your province and be able identify them.	List and identify arthropods that are significant pest problems in your province.
- **describe IPM methods for managing the arthropod pests that are significant problem in the province.**	Know IPM approaches to manage the arthropods that are significant problems in your province.	Describe IPM approaches to manage arthropods that are significant problems in your province.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Vertebrate Pests Vertebrate animals such as birds and rodents are pests when they damage property and when they carry diseases affecting man, animals or birds.	Know when vertebrate animals are pests.	Identify when vertebrate animals are pests.
Vertebrate pests of structures can include: - birds - rodents - bats - racoons.		
When planning a control program, consider: - benefits versus the damage caused by the pests; - whether they are a protected species in Canada or in your province; - hazards of the control program to non-target species; - whether they are above the minimum threshold level (that they can be tolerated).	Know the factors to consider when planning a control program.	List the factors to consider when planning a control program.
Pest Behaviour and Biology Knowing vertebrate pest behaviour and biology is important as it helps you determine the most effective control methods, the best time to implement the control and the best location for control (e.g., placement of traps or poisoned baits).	Understand why it is important to know about the behaviour and biology of vertebrate pests.	Describe the behaviour of structural vertebrate pests. Describe the biology of structural vertebrate pests.
The choice of control methods will depend upon the following characteristics of the pest: - population density; - mobility; - habitat; - preferred foods; - behavioural attributes (climbing, burrowing, flying, perching, etc.);	Know the characteristics of the pest that should be considered when selecting a vertebrate pest control method.	List the characteristics of the pest that should be considered when selecting the vertebrate pest control method.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
- sharing food; - wariness of humans and foreign objects; - predators (place in food chain); - impact on non-target species, and; - availability of food for the pest.		
The best time to implement a control method will depend upon: - the availability of food; - when migration takes place; - when the young are born. Population numbers are lowest before the young are born. Controls should be set in place before this time; - when the pests are actively moving about in search of food; - whether the pest hibernates.	Know what should be considered when selecting the timing for a vertebrate control program or method.	List the factors that should be considered when selecting the time for controlling vertebrate pests.
The best location to control vertebrate pests depends upon finding the: - burrow or nest/roost; - regularly travelled routes; - feeding areas.	Know what should be considered when selecting the location for a vertebrate control program or method.	Describe the locations that should be considered for a vertebrate control program or method.
Pest Management Methods for Vertebrate Pests Vertebrates should be controlled following an integrated pest management (IPM) approach. Plan the IPM program by considering the pest, the commodity, plant or animal that is being affected, the environment, and the available treatments methods.	Know that vertebrates should be controlled through an IPM approach.	Identify that vertebrate should be controlled through an IPM approach.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
The components of an IPM program specific to the structural certification category (prevention, identification, monitoring, injury and action thresholds, treatments and evaluation) are each discussed below.	Know the components of an IPM program.	List the components of an IPM program.
Prevention Vertebrate pest problems can be prevented by: - excluding them from a feeding or breeding location; - destroying or changing the habitat (removing nesting and hiding sites); - removing potential sources of food; - installing barriers to exclude them; - encouraging natural predators.	Know how to prevent vertebrate pest problems.	Describe ways to prevent vertebrate pest problems.
Identification Assistance in pest identification may be provided government officials, or government/industry publications.	Know ways to identify pests.	Describe ways to identify pests.
Monitoring Monitoring consists of regularly scheduled inspections to get an indication of the size, extent and location of a pest population. Detailed written records should be kept. Inspection includes searching for evidence of an infestation, such as actual pest sightings, droppings, rodent hairs, and damage. It may be required both within a structure and immediately surrounding the structure or in the case of some rodents, inspection of an area away from structures. Inspection should also note any means of pest harbourage, including means of entry into the structure and sources of moisture, food and heat in the heating, plumbing and electrical systems. This is important because pests use these systems as pathways into and through buildings. Obtaining information from	Know when and how to monitor vertebrate pests.	Identify when to monitor for vertebrate pests. Describe how vertebrate pests can be monitored.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
people working or living in the structure is also an important part of the inspection. Tools required to perform a proper inspection include a flashlight*, hand lens*, hand tools, collecting vial and glueboards. A mechanic's mirror* and a stethoscope are also helpful in some situations (*Do not bring glass into a food plant).		
Injury and Action Thresholds Setting injury and action thresholds for vertebrate pests in and around the structure often involves considering, the level of unacceptable injury from a pest, economic damage, a medical or health hazard, and nuisance or aesthetic impacts. Setting injury and action thresholds for rodent pests away from structures often involves considering economic damage, numbers of rodents, or the number of rodent burrows or mounds.	Know how to set injury and action thresholds for vertebrate pests.	Describe how to set injury and action thresholds for vertebrate pests.
Treatments The following IPM treatment methods (described in the core) should be considered and used (alone or in combination) where appropriate: cultural, biological, physical, mechanical and chemical.	Know the treatment methods used in IPM.	List the treatment methods used in IPM.
Cultural treatments have been discussed under prevention.	Know cultural management treatments for controlling vertebrate pests.	Describe cultural management treatments for controlling vertebrate pests.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Physical treatments can include sealing openings into buildings, using spikes and wires on bird roosting sites or other barriers/deterrents to the pests to keep pests away.	Know physical methods of excluding vertebrate pests.	Describe physical methods of excluding vertebrate pests.
Mechanical treatments use machines or devices to control pests and include: - frightening away or repelling the pest such as using devices that flap in the wind, plastic owls, ultrasonic sound repellent devices (rodent control); - trapping the pest including use of snap traps, glueboards and sticky pastes (rodent control), and live trapping for large vertebrates.	Know mechanical treatments for controlling vertebrate pests.	Describe mechanical treatments for controlling vertebrate pests.
Chemical treatment includes the use of rodenticides and avicide/repellents to control vertebrate pests.	Know the types of vertebrate control products used in the Structural Category and how they work.	Describe the types of vertebrate control products used in the Structural Category and how they work.
See the General Information section for a description of the chemical families/groups.		
When selecting rodenticides, a decision may be required whether to use an acute rodenticide versus a multiple or single feeding anticoagulant rodenticide. Acute rodenticides are highly toxic and may result in a quick reduction in rodent population as death can occur in 24 hours or less following ingestion. The acute rodenticides are not recommended for use around residences. They must be applied in locations and in a manner such that they will not be carried by rodents or wind onto food or food preparation surfaces or where they will be exposed to people or non-target animals.	Understand the differences between acute rodenticides and multiple or single feeding anticoagulant rodenticides.	Compare acute rodenticides with multiple or single feeding anticoagulant rodenticides.
	Understand bait shyness.	Describe bait shyness.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Anticoagulants are generally safer than acute rodenticides A single-feeding anticoagulant is more toxic that a multiple-feeding one. Thus, if there is a risk to non-targets animals, a multiple-feeding anticoagulant is the best alternative when using rodenticides. Fume releasing rodenticides, involving the combustion of canisters, should not be used near buildings or other combustible materials. For bird control, there are non-poisonous chemical repellents (also called sticky paste repellents). They may be difficult to apply to awkward areas and may not last long in the places exposed to wind and rain. There are a few poisonous chemical repellents and they must be used with care and skill to avoid poisoning non-target animals.		
Evaluation The last step in an IPM program includes reviewing all aspects of the program; evaluating the results and where desired effectiveness has not been achieved, identify changes that can be made to improve the program's effectiveness.	Know how to evaluate an IPM program for vertebrate control.	Describe how to evaluate an IPM program for vertebrate control.
Legal Status of Pest Management Methods Legislation for the protection of wildlife may prevent the destruction of some pests or may require special permits for their control. Shooting, trapping and the use of pesticides may be limited to specific times of the year or specified provinces or geographic locations.	Know how laws may affect the control of vertebrate pests.	Describe how laws may affect the control of vertebrate pests.

Category: STRUCTURAL

Concept: PEST MANAGEMENT - VERTEBRATE PESTS

General Objective: To understand pest management principles required to carry out the safe and effective control of vertebrate pests.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Check with provincial authorities about laws that could affect vertebrate control programs before controlling vertebrate pests.	Know laws that could affect control programs for vertebrate pests. Know whom to contact for information on provincial laws.	Identify laws that may affect proposed vertebrate control programs. Identify whom to contact for information about the laws.
NOTE: When developing manuals: - **describe the vertebrate pests that are a significant problem in the province where the manual will be used;**	Know which vertebrate pests are significant problems in your province and be able identify them.	List and identify the vertebrate pests that are a significant problem in your province.
- **describe IPM methods for managing the vertebrate pests that are significant problem in the province.**	Know IPM methods for managing the vertebrate pests that are significant problems in your province.	Describe IPM methods for managing the vertebrate pests that are significant problems in your province.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - APPLICATION TECHNIQUES

General Objective: To understand the application techniques used in structural pest management.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Application Techniques Pesticide application techniques used for structural pest management include: - broadcast; - spot; - crack and crevice; - space; - baits.	Know the general types of pesticide application techniques used for structural pest management.	List the general types of pesticide application techniques used for structural pest management.
Broadcast application refers to the application of pesticides to broad expanses of surfaces such as walls, floors, ceilings and foundations where insects are or may be found.	Understand the term broadcast or general application.	Define broadcast or general application.
Spot application refers to the limited application of pesticides to localized or specific surface areas not greater than 0.186 m^2 where insects are likely to occur. Spots are not to be adjoining (contiguous) and the total area of the spots is not to exceed 10% of the surface area being treated (e.g., carpets). A pesticide registered for spot treatment only is not to be applied as a broadcast treatment. There is an increase in exposure potential to the applicator and bystanders during broadcast application.	Understand the term spot application.	Describe spot application.
Crack and crevice application refers to the application of small amounts of insecticide or rodenticide directly into cracks and crevices where insects or rodents hide or through which they may enter a structure. It does not permit the treatment of surfaces.	Understand the term crack and crevice application.	Describe crack and crevice application.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - APPLICATION TECHNIQUES

General Objective: To understand the application techniques used in structural pest management.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Space treatment refers to the application of a non-residual contact insecticide as a suspension of fine droplets in air within an enclosed space.	Understand the term space treatment.	Describe space treatment.
Bait application refers to the placement of insecticide, rodenticide or avicide bait where insect, rodent or bird pests are found. Baits are available as solids, gels or liquids, and placed in crevices, voids, bait boxes, or other protected areas.	Understand the term bait application.	Describe bait application.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - TYPES OF APPLICATION EQUIPMENT

General Objective: To know how to select the correct type of application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Application Equipment The type of equipment required to apply pesticides depends on: - the formulation; - the size and location of the treatment area; - the requirements specified on the label; and - the pest. Application equipment should: - minimize worker and bystander exposure; - minimize off-target release; - apply the correct amount per site or area; - uniformly distribute the pesticide for broadcast applications; - maximize treatment effectiveness.	Know the criteria for selecting appropriate application equipment.	List the criteria for selecting appropriate application equipment.
Application equipment used for structural pest management includes: - sprayers; - dusters; - foggers; - insect bait applicators; - rodenticide bait stations.	Know the main types of application equipment used for structural pest management.	List the main types of application equipment used for structural pest management.
Sprayers Sprayers are used to apply water or oil-based insecticides to surfaces or cracks and crevices. The liquid spray mixture is pressurized in either the tank or hose and forced through a small orifice (nozzle) to produce spray droplets. This process is referred to as hydraulic pressure atomization. Sprayers are used for broadcast, spot, and crack and crevice treatments.	Understand the purpose and basic operation of sprayers.	Describe the purpose and basic operation of sprayers.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - TYPES OF APPLICATION EQUIPMENT

General Objective: To know how to select the correct type of application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Sprays are applied with hand-operated compressed air sprayers, power hose sprayers or ready-to-use (RTU) pressurized containers.	Know the types of sprayers used for structural pest management.	List the types of sprayers used for structural pest management.
Hand-Operated Compressed Air Sprayers The hand-operated compressed air sprayer was once the most widely used type of equipment in structural pest management. Now, the use of baits and crack and crevice injectors has decreased the need to use compressed air sprayers in many structural pest control programs. Compressed air sprayers provide adequate tank capacity, operating pressure, and spray patterns for most broadcast, spot, and some crack and crevice treatments on the exterior and interior of structures (e.g., for the control of carpet beetles, bedbugs and fleas).	Understand why compressed air sprayers are used for structural pesticide applications.	Identify why compressed air sprayers are used for structural pesticide applications.
Power Hose Sprayers A power hose sprayer uses a power-driven pump to provide pressure to the hose and nozzle. Power hose sprayers may be useful when applying large volumes of spray mix as a broadcast or spot application such as to inside walls and floors of large commercial buildings to control insect or other arthropod pests.	Know when power hose sprayers are used for structural pesticide applications.	Identify when power hose sprayers are used for structural pesticide applications.
Ready to-Use Pressurized Containers Some pesticide products for insect and other arthropod control are formulated for commercial use in ready-to-use pressurized containers. Some containers produce very tiny droplets (aerosols) which float in air for a time before settling on surfaces. Other products are designed to produce larger droplets (coarse sprays) that are meant to be deposited directly on surfaces. These products require no mixing or sprayer clean-up.	Know how ready-to-use pressurized containers can be used for structural pest control.	Describe how ready-to-use pressurized containers can be used for structural pest control.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - TYPES OF APPLICATION EQUIPMENT

General Objective: To know how to select the correct type of application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Dusters Dusters are used to apply dust formulations of pesticides, typically into cracks and crevices or wall voids for insect control. There are hand operated dusters and powered dusters. The latter may use compressed air cylinders filled remotely, or have a built in air pump. There are power micro-dusters that allow delivery of precise amounts to small cracks and voids and obtain excellent penetration. Most applications require only a thin layer of dust to be applied to be most effective. Effective dusting requires knowledge of pest biology and building construction to know where to place it (e.g., holes may need to be drilled to gain access to wall voids).	Know how dusters can be used for structural pest control.	Describe how dusters can be used for structural pest control.
Foggers Specially formulated pesticides are made for application by fogging equipment. The pesticide is applied as tiny droplets, usually in the 1-30 micron diameter size range that can be carried by air currents through buildings such as warehouses, farm facilities or restaurants. The small droplets are produced by spinning discs or fine nozzles and high pressures in the fogger. This type of application is often referred to as ultra low dose (ULD) application, where a small amount of a relatively concentrated pesticide is released within a large volume. Foggers can be effective in controlling insects exposed to the fog during application, but the tiny droplets do not penetrate well into cracks and crevices, equipment or boxes and typically need to be used in conjunction with sanitation and/or residual sprays.	Know how foggers can be used for structural pest control.	Describe how foggers can be used for structural pest control.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - TYPES OF APPLICATION EQUIPMENT

General Objective: To know how to select the correct type of application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Insect Bait Application A few pesticides are formulated into baits for application as a paste or gel by using a spatula or squeeze tube for control of, as yet, a limited number of structural insect pests (primarily cockroach and ant baits). They are to be injected or scraped into cracks and crevices. Some insecticide baits are manufactured in an enclosed bait station so the insect must enter to feed on the bait and thereby contact the toxicant. Such baits should be placed in locations that are inaccessible to children or pets.	Know how insecticide baits are formulated. Know where the insecticide bates are placed.	Describe how insecticide baits are formulated. Describe where the insecticide bates are placed.
Rodenticide Bait Stations Rodenticide baits are materials a rodent will feed on, mixed with a pesticide. These baits often contain a grain material as a feeding attractant, are available in a wide variety of ready-to-use formulations including pellets, loose meal, seeds and paraffin blocks. Rodenticide baits may be purchased in small bags (i.e., place packs) or other type of container (i.e., baiters) that contain a fixed amount of bait. These bait formulations do not require any preparation or handling of the rodenticide. Bait bags are left unopened for the rodent to find and open so the bait is kept fresh, intact and safely contained. Unopened bags can be used to monitor rodent activity. Some commercial rodenticides are purchased in bulk form and require some preparation. This involves determining the amount of rodenticide required and placing it into appropriate bait stations.	Know how rodenticide baits are formulated and how they are used.	Describe how rodenticide baits are formulated. Describe how rodenticide baits are used.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - TYPES OF APPLICATION EQUIPMENT

General Objective: To know how to select the correct type of application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
A few rodenticides are available in concentrated forms and require mixing with a food attractant, or as liquid baits that require mixing with water to provide a toxic water source for rodents.		
Each type of ready-to-use bait has advantages or disadvantages under certain circumstances. For example, paraffinized-block baits offer the advantages of protecting the bait from moisture and providing an attractive gnawing surface for rodents. Also, they are easy to handle and can be easily secured inside a tamper resistant bait station. However, they may also present a disadvantage by being more attractive to non-target animals such as pets. Pellet, meal and seed baits are easy to handle and are similar to natural rodent foods. However, such loose baits are more easily scattered or removed by rodents and deposited in areas accessible to non-target species.	Know the advantages and disadvantages of paraffinized-block baits and pellet, meal or seed loose baits.	Compare and contrast the advantages and disadvantages of paraffinized-block baits versus pellet, meal or seed loose baits.
Bait stations used to apply rodenticide are available as either open or covered trays, and tamper-resistant bait boxes.	Be familiar with the basic types of rodenticide bait stations.	Describe the basic types of rodenticide bait stations.
Open bait trays do not protect the bait from anything that might fall on it (e.g., dust or water) and must be used in areas inaccessible to humans or pets. They are inexpensive and are easily checked for rodent feeding activity.	Know the advantages and disadvantages of each.	List advantages of open bait trays. List disadvantages of open bait trays.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - TYPES OF APPLICATION EQUIPMENT

General Objective: To know how to select the correct type of application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Covered bait trays offer the advantages of protecting the bait from spillage and the elements, and provide an attractive feeding location for rodents. The disadvantage is the light construction (thin plastic or cardboard). They may be easily opened or destroyed, making it necessary to use them in areas inaccessible to non-target species.		List advantages of covered bait trays. List disadvantages of covered bait trays.
Tamper-resistant bait boxes are constructed from heavier materials (hard plastic or metal) with a baffled feeding area, and may be locked and anchored to the ground or structure. They must be clearly labelled DANGER POISON. They are designed so that children and non-target animals cannot access the baits and they prevent the bait being shaken loose. Baits which are highly toxic require packaging in tamper-resistant bait stations to reduce potential for accidental ingestion by children and non-target animals.		List advantages of tamper-resistant bait boxes.
Avicide Bait Stations Avicide baits contain grains as feeding attractants. The grain which is used will be attractive to specific bird pests. The bait may be formulated as a ready to use product or may have to be mixed to obtain the correct proportion of toxicant in the bait.	Know how avicide baits are formulated.	Describe how avicide baits are formulated.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Sprayer Terminology		
Nozzle output: the volume of spray produced by a nozzle per minute. **Pesticide rate**: the amount of pesticide to be applied as stated on the label, Most pesticide rates for structural insect pests include a dilution rate (mix a specified amount of pesticide with a water or oil carrier) and instructions on how to cover the treatment area (e.g., apply only enough spray to cover surfaces and avoid runoff). For a few types of structural treatments (e.g., fly control on walls) the pesticide rate may be given as the amount of pesticide to apply per unit area (e.g., ml/10 m^2. **Spray width**: for broadcast sprays using a single nozzle, spray width is the width from the center of one pass to the center of the next. **Sprayer application rate**: The amount of spray mix that a sprayer applies per unit of area conducted in typical treatment conditions, (e.g., 100 mL/10 m^2). **Carrier:** the liquid that is added to the pesticide product to prepare the spray mix to permit the pesticide to be delivered to the target site through the appropriate application equipment. A carrier added to a pesticide product to dilute it, is usually called a diluent.	Know the meaning of the following terms: - nozzle output; - pesticide rate; - spray width; - sprayer application rate.	Define the meaning of the following terms: - nozzle output; - pesticide rate; - spray width; - sprayer application rate.
Components of Hand Operated Sprayers		
Hand-operated sprayers have the following major components - tank, pump unit and application wand with hose and nozzle.	Know the basic components of a hand operated compressed air sprayer.	List the basic components of a hand operated compressed air sprayer.
Spray tanks are usually constructed from stainless steel, and have a 2, 4, 8 or 12 litre capacity. These capacities are standard for structural applications. Many pesticide labels provide dilution information for these specific volumes.	Know the general size, and construction material and maintenance for spray tanks.	Describe the general size, and construction material and maintenance for spray tanks.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
The pump unit consists of a pump cylinder, plunger rod and cup, and a pumping/carrying handle. It is hand-pumped to generate pressure inside the tank (in the head space above the liquid), which forces the spray mixture through the application hose and wand. Normal operating pressure for spraying inside a structure is 140 kPa (20 psi). Higher pressures may be used when spraying the exterior of a building.	Know how pumps work, typical pressures and general maintenance.	Describe how pumps work, typical pressures and general maintenance.
The application wand and hose deliver the spray mixture from the tank to the target area. The application wand consists of the handle with a valve trigger, extension tube and nozzle, to control the flow of the spray mix and the spray pattern delivered. The nozzles for structural sprayers generally have a lower flow rate than landscape and garden sprayers and have a no-drip feature such that flow is shut off at the nozzle rather than at the valve. The application hose is constructed of synthetic rubber to be flexible and resistant to corrosion and punctures.	Know the major parts of the application wand and how they work.	Describe the major parts of the application wand and how they work.
Nozzles are available in various styles and sizes, but most hand sprayers are equipped with multi-tip nozzles that produce both fine and coarse flat fan spray patterns (80 and 50 degree spray angles respectively), and a pinstream pattern. Nozzle tips, usually made of brass, are easily damaged.	Know types of nozzles typically used on a sprayer and their maintenance.	Describe types of nozzles typically used on a sprayer and their maintenance.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Components of Power Hose Sprayers Components of a power sprayer include: - spray tank; - pumps; - strainers; - controls; - pressure gauge; - plumbing; - structural framework; - nozzles.	Know the various components of motorized sprayers.	List the main components of motorized sprayers.
The major differences between hand and power operated sprayers are the pump system and the larger spray tank, with agitators and filters.	Understand the pump system in power hose sprayers and know the common types of pumps.	Describe the pump system in power hose sprayers.
Spray Tanks Spray tanks hold the spray mixture and are available in a variety of shapes, sizes and materials. Tanks should be: - corrosion resistant; - strong; - easy to fill and shaped to drain completely; - easy to clean; - labelled with graduated markings; - equipped with baffles to prevent sloshing; - non-reactive with pesticides and adjuvants.	Know the features of a tank on a power hose sprayer and requirements for agitators and strainers.	Describe the features of a tank on a power hose sprayer and requirements for agitators and strainers.
Tanks are normally constructed of polyethylene, fibreglass or stainless steel with a holding capacity of 100 to 400 L. There should be an agitation system to ensure the spray is adequately mixed.		

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Pumps Pumps must provide the flow of spray mixture from the tank to the nozzle. Choose a pump suitable for the: - required output and operating pressure; - pesticide properties; - carrier* properties; - power supply. Choose a pump with sufficient capacity, considering: - nozzle output; - agitation requirements; - bypass filtration requirements. In a power hose sprayer, the pump is usually driven by a gasoline or electric engine. The pump pressurizes the liquid in the spray hose at a normal operating range of 200 to 350 kPa (30 to 50 psi). The 3 common types of pumps used for structural applications are the diaphragm, piston, and roller. The pump flow capacity should be 20% greater than the capacity needed. This will maintain proper pressure and flow: - as the pump wears; - if nozzle size increases.	Know the factors to consider in selecting the correct type and size of pump.	List the factors to consider when selecting a pump.
The type of pump affects the installation of controls. Refer to pump manufacturer's instructions. Piston and diaphragm pumps require a pulsation damper to minimize pressure fluctuations. Roller pumps can wear quickly and are not recommended when using abrasive formulations.	Know that there are special requirements and limitations associated with different pump types.	Identify the special requirements or limitations that may be associated with different types of pumps.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Strainers Manufacturers generally use the term strainers instead of filters.		
Strainers prevent any debris and undissolved pesticides in the spray mixture from damaging the pump or plugging the nozzles.	Know why strainers are required.	Identify why strainers are required.
Strainers can be installed: - in the tank opening to prevent objects and debris from entering the tank during filling; - between the tank and the pump to protect the pump from damage; - after the pump to remove finer particles before entering the spray lines; - in the nozzle bodies to prevent the nozzles from clogging.	Know where strainers can be installed.	Describe where strainers can be installed.
Strainers should be scaled from the coarsest at the tank opening, to the finest at the nozzle. Smaller nozzles require finer strainers. Be sure the strainers are coarse enough when using wettable powders or flowable formulations.	Know how to select the correct strainer size.	Describe how to select the correct strainer size.
Follow manufacturer's recommendations for the specific size of strainers required to protect their nozzles and pumps.	Know where to obtain information on correct strainer size.	Identify where to obtain information on correct strainer size.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Controls Two common control systems are: - pressure control systems; - volume control systems. Pressure control systems use a pressure-regulating valve (PRV) to maintain a constant operating pressure.	Know the common control systems and how they work.	List the common control systems and describe how they work.
Plumbing The size of hoses and fittings affects system capacity and the pressure. Under-sized hoses and fittings can severely reduce the capacity of any pump. Suction hose diameter should be at least as large as the pump intake opening. Common sources of flow restrictions are: - under-sized plumbing; - under-sized controls or fittings; - kinked hoses; - under-sized or clogged strainers. Hoses and fittings on the pressure side of the pump must be able to handle the maximum pressure the pump can develop and withstand pressure surges.	Understand how plumbing can affect the pressure.	List common plumbing problems that affect the pressure. Describe how these problems affect pressure.
Gauges Gauges are available as either liquid filled or dry. A liquid filled gauge dampens pressure pulsations resulting in a steadier reading, but is also slower to respond to changes in pressure. Pulsation dampers are available for dry gauges. Gauges should identify pressure in commonly used units (psi, Kpa, bar).	Know the types of pressure gauges available and how to select a gauge with the appropriate range.	Describe the types of pressure gauges available and how to select a gauge with the appropriate range.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
The maximum pressure indicated on the gauge should be approximately twice the intended operating pressure to enable accurate reading of the pressure. If the pump is capable of higher pressures than the gauge, ensure that there is sufficient pressure relief to prevent pressures rising above the gauges maximum pressure to avoid damaging the gauge.		
Nozzles The three primary functions of a nozzle are to: - meter the amount of spray delivered (nozzle output); - atomize the liquid into droplets; - disperse the droplets in a specific pattern.	Understand the functions of a nozzle.	List the functions of a nozzle.
Nozzles are available in a wide range of types, sizes and materials. Nozzles are classified on the basis of type of spray pattern that is developed. Nozzles on motorized sprayers used for structural pest control are usually attached to a spray gun which includes an on/off trigger. Most spray guns allow changing the nozzle tip to achieve different spray patterns or spray flow rate.		
Pesticide labels may recommend specific types and sizes of nozzles and droplet sizes. Follow label directions.	Know that pesticide labels may recommend specific types and sizes of nozzles.	Identify that pesticide labels may recommend the type and size of nozzles to use.
The most common nozzle types are: - flat fan; - pin spray.	Know the most common nozzle types.	List the most common nozzle types.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
A nozzle can produce a range of droplet sizes from very small to large. Droplet sizes range from 100 to 400 microns (1 micron = 1/1000 mm) for a fine spray and greater than 400 microns for a coarse spray. The number of fine droplets increases as the spray pressure is increased or as the size of the nozzle orifice is decreased. Obtain drop size information (spray quality) from the nozzle manufacturer. Spray pressure also affects nozzle output and spray patterns. Pressure should only be used to achieve small changes in output as the pressure must be increased four times to double the output. Low pressures generate narrower fan angles and may cause non-uniform patterns.	Know that a nozzle produces a range of droplet sizes and that droplet size is affected by pressure and size of the nozzle orifice.	Identify that a nozzle produces a range of droplet sizes. Identify what affects droplet size.
Nozzle Materials and Factors Affecting Wear The rate of nozzle wear depends on: - nozzle material; - pesticide formulation; - operating pressure; - nozzle size; - the amount of use (time). Nozzle wear increases with softer nozzle materials, more abrasive formulations, higher operating pressures, smaller nozzle size, and longer use. The harder the nozzle material, the longer the nozzle will last but the higher the initial cost. Brass is one of the softest nozzle materials and ceramic is one of the hardest. Other materials such as stainless steel and plastics fall between these two.	Know the factors that affect nozzle wear rates.	Describe the factors that affect nozzle wear rates.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYER TERMINOLOGY AND COMPONENTS

General Objective: To understand the function of sprayer components.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Replace nozzles when they are worn out. The nozzle output and spray pattern change, reducing application uniformity. To determine the amount of wear, compare worn nozzle output to manufacturer's specifications of a new nozzle output. Replace a nozzle with an output that deviates from the manufacturer's specified output by more than 10%.	Understand why nozzles must be replaced.	Identify why nozzles must be replaced.
Clean Water Tank All motorized sprayers should be equipped with a clean water tank. They provide a source of clean water for emergencies and to perform routine tasks such as nozzle and hand cleaning.	Know why sprayers should be equipped with clean water tanks.	Describe why sprayers should be equipped with clean water tanks.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - CALIBRATION OF A SPRAYER

General Objective: To understand the calibration procedure to ensure the correct amount of pesticides will be applied.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Sprayer Calibration Sprayer calibration is required when the pesticide rate is given as an amount of pesticide per area. The purpose of calibration is to determine the sprayer application rate, usually expressed as spray volume per unit area (L/ha), and if necessary to adjust the sprayer application rate to label requirements. Sprayer application rate must be determined in order to determine the correct amount of pesticide to add to the spray tank.	Know when application equipment must be calibrated and why.	Identify when application equipment which must be calibrated and describe why.
The basic steps for sprayer calibration are: 1. check sprayer set-up to ensure nozzles, pumps, lines, agitation and filters are operating properly; 2. determine the sprayer application rate by measuring the volume of water applied to a test area; 3. make adjustments if necessary to correct sprayer application rate.	Know the basic steps involved in sprayer calibration for broadcast applications.	Describe the basic steps involved in sprayer calibration for broadcast applications.
Checking sprayer set-up involves the following: - before starting a motorized sprayer check all strainers are clean; - check that nozzles are the correct type; - with sprayer running and with water in spray tank, check for leaks and that valves and agitation in tank is working; - adjust pressure regulator, check pressure gauge; - check that pattern from nozzle is not distorted, replace if necessary.	Know what to check before calibrating sprayer application rate.	Describe what to check before calibrating sprayer application rate.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - CALIBRATION OF A SPRAYER

General Objective: To understand the calibration procedure to ensure the correct amount of pesticides will be applied.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
The volume of water applied to a test area is determined as follows: - mark a test area and measuring its size (e.g., 5 m × 5 m); - fill the sprayer with a measured volume of water; - spray the test area evenly, moving the nozzle over the area at a constant speed (to be used during pesticide application); - measure the quantity of water left in the spray tank; - determine the volume sprayed on the test area.	Know the process to determine the amount of water applied to a test area.	Describe the process to determine the amount of water applied to a test area.
To calculate sprayer application rate for a standard area such as 100 m^2 use the following type of formula: sprayer applic. rate (L/100 m^2) = $\frac{\text{volume applied to test area (L)}}{\text{size of test area } (m^2)} \times 100$	Know how to calculate sprayer output using the volume applied to a test area.	Calculate sprayer output using the volume applied to a test area.
If the sprayer application rate must be adjusted to meet label specifications, small changes can be made by changing the speed the nozzle is moved across the test area. If large changes in application rate are required, nozzles should be changed. Obtain assistance in nozzle selection from a supplier if required. Reapply to the test area if speed or nozzles are changed.	Know how to adjust sprayer application rate.	Describe how to adjust sprayer application rate.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: ENVIRONMENTAL CONSIDERATIONS

General Objective: To understand the influence of environmental conditions on the application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Spray Calculations Structural pesticide applicators routinely prepare spray mixtures from concentrated products. Most structural pesticide labels have a spray dilution chart to simplify the process. The label must be kept in readable condition or a copy must be obtained. Applicators should mix enough for each specific treatment so that no unused pesticide is left over to be disposed of.	Understand why a structural applicator must be able to perform dilution calculations.	Identify why a structural applicator must be able to perform dilution calculations.
Structural applicators must be able to determine the volume of concentrate required to prepare a correct dilution. Where the recommended sprayer application rate is a dilution, calculate the amount of pesticide concentrate to make the required amount of spray as follows: Pesticide Conc.(L) = Required spray (L) × Dilution rate (L/L)	Know how to perform the basic calculations to make up a spray mixture when the label specifies a dilution rate.	Perform the basic calculations to make up a spray mixture when the label specifies a dilution rate.
Some structural pesticide labels also indicate you are to apply a specified amount of spray per unit area (e.g., to floors or walls). Applicators should be able to calculate the area to be treated, the total pesticide required and the amount of pesticide required to make up a selected amount of spray in the spray tank. To determine the amount of pesticide required to make up spray, you need to first calculate the area that can be sprayed by a given volume in the spray tank based on your calibrated sprayer application rate (see previous discussion on calibration). Then you use the area sprayed by your spray tank to determine the amount of pesticide to make up the spray.	Know how to perform the basic calculations required when the pesticide label also has a recommended sprayer application rate.	Perform the basic calculations required when the pesticide label also has a recommended sprayer application rate: - calculate the area to be treated; - calculate the amount of pesticide required for the treatment area; - calculate the area to be covered by a specified volume of spray; - calculate the amount of pesticide required in the specified volume of spray.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: ENVIRONMENTAL CONSIDERATIONS

General Objective: To understand the influence of environmental conditions on the application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
1. Area to be treated: Treatment area (m^2) = Length (m) × Width (m)	Know how to calculate the amount of pesticide for the treatment area.	
2. Total pesticide required for treatment area: Pesticide required (L) = Area (m^2) × Pesticide rate (L/m^2)		
3. Area covered by selected amount of spray in tank: Area covered (m^2) = $\frac{\text{Spray volume in tank (L)}}{\text{Sprayer application rate } (L/m^2)}$	Know how to calculate the amount of pesticide in a specified volume of spray.	
4. Pesticide required to make specified volume of spray: Pesticide req. (L) = Pesticide rate ($L/100\ m^2$) × area covered (m^2)		
Calculations For Baits Many rodent and bird control baits are packaged ready to use. Some rodenticides and avicides can be purchased as concentrates and are mixed with untreated bait in the proportion specified on the label. The amount of pesticide concentrate to add to make the required amount of treated bait is calculated as follows: Amount of Pesticide (L or kg) = Mass of required bait (kg) × Concentration of pesticide in the bait (L/kg or kg/kg)	Know how to perform calculations used to make up baits when the label specifies to mix a quantity of concentrate with a quantity of untreated bait.	Perform calculations used to make up baits when the label specifies to mix a quantity of concentrate with a quantity of bait.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: ENVIRONMENTAL CONSIDERATIONS

General Objective: To understand the influence of environmental conditions on the application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Calculations for Space Treatments To perform accurate space treatments, the applicator must be able to determine the volume of various structures such as a building with a peaked roof and a flour bin), and the volume of product and length of time required to complete the application. For space treatments the following calculations are required:	Know how to perform calculations used in space treatments.	
1. Volume of building Volume from floor to top of wall = Length × Width × Height (from the floor to top of wall) plus Volume under ridged (peaked) roof (when present) = $\frac{\text{length} \times \text{width} \times \text{height}}{2}$ (from top of wall to ridge of roof) $m^3 = (m \times m \times m) + (½\ m \times m \times m)$		Calculate the volume of a structure.
2. Volume of cylindrical flour bin with cone top or bottom Cylindrical barrel = $22/7 \times (\text{radius of cylinder})^2 \times \text{height of cylinder}$ plus Conical top or bottom = $\frac{22/7\ (\text{rad. of cylind.})^2 \times \text{height of cone}}{3}$ $m^3 = (22/7 \times m^2 \times m) + (1/3 \times 22/7 \times m^2 \times m)$		Calculate the volume of a cylinder with a conical top.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: ENVIRONMENTAL CONSIDERATIONS

General Objective: To understand the influence of environmental conditions on the application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
3. Required quantity of pesticide to treat a structure Required pesticide = Volume of structure × Pesticide rate $L = m^3 \times L/m^3$		Calculate the volume of product required.
4. Length of time required to treat a structure with a fogger Time = Required pesticide / Fogger application rate Min = L / L per min		Calculate the length of time required when using a fogger.
Note: When developing a training manual, sample calculations are required to improve understanding.		
Spray Drift and Vapour Generation Before beginning any application, evaluate conditions at the application site to determine if there are sites or objects of concern nearby (e.g., food preparation surfaces, bedding, clothing and open windows of nearby residences). Certain objects (such as food, dishes or toys) may have to be removed, spray or vapour drift may have to be minimized and buffer zones may have to be used. Spray drift may be minimized by using sprays with no fine droplets, holding the spray gun closer to the target and ensuring air movement from wind or air circulation fans will not carry droplets to areas of concern. It may be necessary to leave a buffer zone (no treatment zone) between the treatment area and an area of concern to ensure no pesticide contacts.	Know when spray and vapour generation may be a concern and how it can be minimized.	Describe times when spray and vapour generation may be a concern and how it can be minimized.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: ENVIRONMENTAL CONSIDERATIONS

General Objective: To understand the influence of environmental conditions on the application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Pesticide vapour concentrations may be a concern inside residences and work areas when people reenter. Minimize vapour concentrations by using pesticides that have low vapour release rates, by ensuring an adequate reentry period has elapsed and by maximizing air exchange in structures before occupancy.		
Water Quality and Pesticide Effectiveness Temperature, sediment, pH, and presence of mineral ions in the water that is mixed with pesticides may affect pesticide performance.	Understand how water quality may affect the performance of the pesticide.	List characteristics of water quality that could adversely affect the performance of the pesticide.
High pH can cause breakdown of some insecticides.	Know the factors that affect the rate of pesticide breakdown.	List the factors that could affect pesticide breakdown.
The rate at which pesticide breakdown occurs depends on: - the pH of the water; - the amount of pesticide added to a fixed amount of water; - the water temperature; - the length of time the solution is left in the spray tank.		
Silt and organic matter in the water can cause: - premature pump wear; - plugging of screens; - decreased pesticide effectiveness.	Know the effects of silt and organic matter in the water.	Describe the effects of silt and organic matter in the water.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: ENVIRONMENTAL CONSIDERATIONS

General Objective: To understand the influence of environmental conditions on the application equipment.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
If you suspect there is a problem with water quality you should: - have the water tested; - seek another source of water; - obtain advice on pesticide application.	Know the options if water quality is a problem.	Identify the options if water quality is a problem.
Refer to the pesticide label or to provincial publications for specific recommendations.	Know where to find specific recommendations for water quality.	Identify where to find specific recommendations for water quality.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: MAINTENANCE

General Objective: To understand the basic procedure in maintaining and cleaning sprayers.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Sprayer Maintenance Proper maintenance of application sprayer minimizes the chance of a breakdown, increases the service life and minimizes the chance of accidental leaks and spills.	Understand the importance of maintaining application equipment.	Identify the importance of properly maintaining application equipment.
Rinse the sprayer thoroughly at the end of each spraying day by washing the outside and flushing clean water through the pump, hoses, and nozzles. Check all screens, strainers and nozzles and clean them if necessary. Assess the sprayer for wear and replace worn or damaged parts. Critical parts to check include agitator, regulator and pressure gauge for accurate operation, couplings and clamps for proper seal, and hose flex points for wear. On hand operated compressed air sprayers, ensure the pump cylinder is lubricated, and check the tank gasket and valve as required. Nozzle maintenance consists of tip replacement when an inconsistent spray pattern is produced. Wash the sprayer and dispose of rinsate only where residues will not cause any adverse environmental harm. Follow directions on the label and provincial regulations. Decontaminate the sprayer when changing from one type of pesticide to another. Decontamination procedures vary depending on the pesticides being used. Consult the pesticide label or manufacturer's representative for specific recommendations.	Understand how to maintain application equipment.	Describe how to maintain application equipment.

Category: STRUCTURAL

Concept: APPLICATION TECHNOLOGY - SPRAYERS: MAINTENANCE

General Objective: To understand the basic procedure in maintaining and cleaning sprayers.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Temporary Storage of Spray Vehicles Evaluate parking sites carefully when parking vehicles that carry pesticides and application equipment. Take the following precautions: - do not park where there is any risk that a pesticide may leak; - into storm drains or other areas that would cause significant impact; - do not park in locations where vandalism may occur; - lock all valves that could allow spray solution to escape if handled by an unauthorized person; - secure pesticide containers in a locked compartment; - inspect spray systems daily to check for tampering; - ensure contaminated clothing is stored in a secure location away from clean clothing; - ensure any spills have been properly cleaned.	Know what precautions should be taken when parking spray vehicles.	Describe the precautions to take when parking spray vehicles.

Category: STRUCTURAL

Concept: PROFESSIONALISM

General Objective: To understand the importance of communication with the public in matters concerning the use of pesticides in structures.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Conducting structural pest management with an IPM approach requires a thorough knowledge of pest biology and the different types of controls. New control methods are being developed. Professional applicators must continue to expand their knowledge beyond the basic certification requirements to learn about new methods and products by: - subscribing to journals; - attending seminars; - participating in information exchanges with members of local associations; and - joining provincial and national associations.	Understand how professional applicators can continue to expand their knowledge.	List ways that professional applicators can continue to expand their knowledge.
A structural pesticide applicator often has more contact with the public than other types of applicators. This is particularly true when servicing offices, hospitals, restaurants and, in particular, private residences where pesticide applications are made in areas used by people, e.g., offices, dining areas, kitchens, bathrooms, living rooms and bedrooms. Consequently, the personal appearance and hygiene, technical knowledge, and attitude of the applicator are of paramount importance. The applicator must convey and demonstrate competence to be applying pesticides inside dwellings where people work, eat, play, and sleep. Failure to do so leaves the public with concerns about the risk of exposure to themselves and their family, plus the possibility of damaging their personal belongings or contamination of food products.	Understand why the applicator must be able to convey competence to the public when applying pesticides inside a structure.	Identify why the applicator must be able to convey competence to the public when applying pesticides inside a structure.

Category: STRUCTURAL

Concept: PROFESSIONALISM

General Objective: To understand the importance of communication with the public in matters concerning the use of pesticides in structures.

COURSE OUTLINE	INSTRUCTIONAL OBJECTIVES	LEARNING OUTCOMES
Good communications with clients is a vital part of a professional approach. This includes: - making certain the requirements of the client are determined, - providing a clear indication to the client about what you can do and what you have done. ensuring that people who live or work in treated areas are notified and given information they want to know.	Understand how to have good communications with clients.	Describe how to have good communications with clients.