

Green Pest Control

Pest Management Professionals Meeting

October 8, 2024

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Pesticide Safety Education Program
<https://www.uvm.edu/extension/psep>

Where trade names or commercial products are used for identification, no discrimination is intended and no endorsement is implied. Always read the label before using any pesticide. The label is the legal document for the product use. Disregard any information in this presentation if it is in conflict with the label.





42 F. W. BOLGIANO & CO.,

DEATH TO BUGS.



Pat. March 15 and Nov. 9, 1897.
Pat. in Canada Nov. 7, 1897,
and Jan. 24, 1900.

HAMMOND'S SLUG SHOT,
5 pounds, 25c.,
11 pounds, 50c.,
25 pounds, \$1.00.

BUG DEATH.
Just the thing to kill them.
1 pound, 15c.,
3 pounds, 35c.,
5 pounds, 50c.,
12½ pounds, \$1.00.



PARIS GREEN, GUARANTEED PURE,
At the Lowest Market Price.

Knapsack and Hand Sprayers.
It is Economy to use these Implements.
THEY REQUIRE LESS
PARIS GREEN OR BORDEAUX MIXTURE
AND DO BETTER WORK.

Price, - - - 50c. up.
BORDEAUX MIXTURE, \$1 per gallon.




“GREEN”

“NATURAL”

“ORGANIC”

“ECO-FRIENDLY”

“NON-TOXIC”

“SAFE”



ALL PESTICIDES ARE TOXIC

“-cide” = TO KILL

According to the law, a pesticide is **any substance** intended to

- **Prevent** any pest.

- **Destroy**
- **Repel**
- **Mitigate**



PESTICIDE EXPOSURE AND RISK

- **Toxicity** = measure of **ability** to cause harm
 - cannot change
- **Exposure** = when you get pesticide **in or on body**
 - can change: dose, time, formulation

RISK = TOXICITY x EXPOSURE

Signal Word: CAUTION = low toxicity

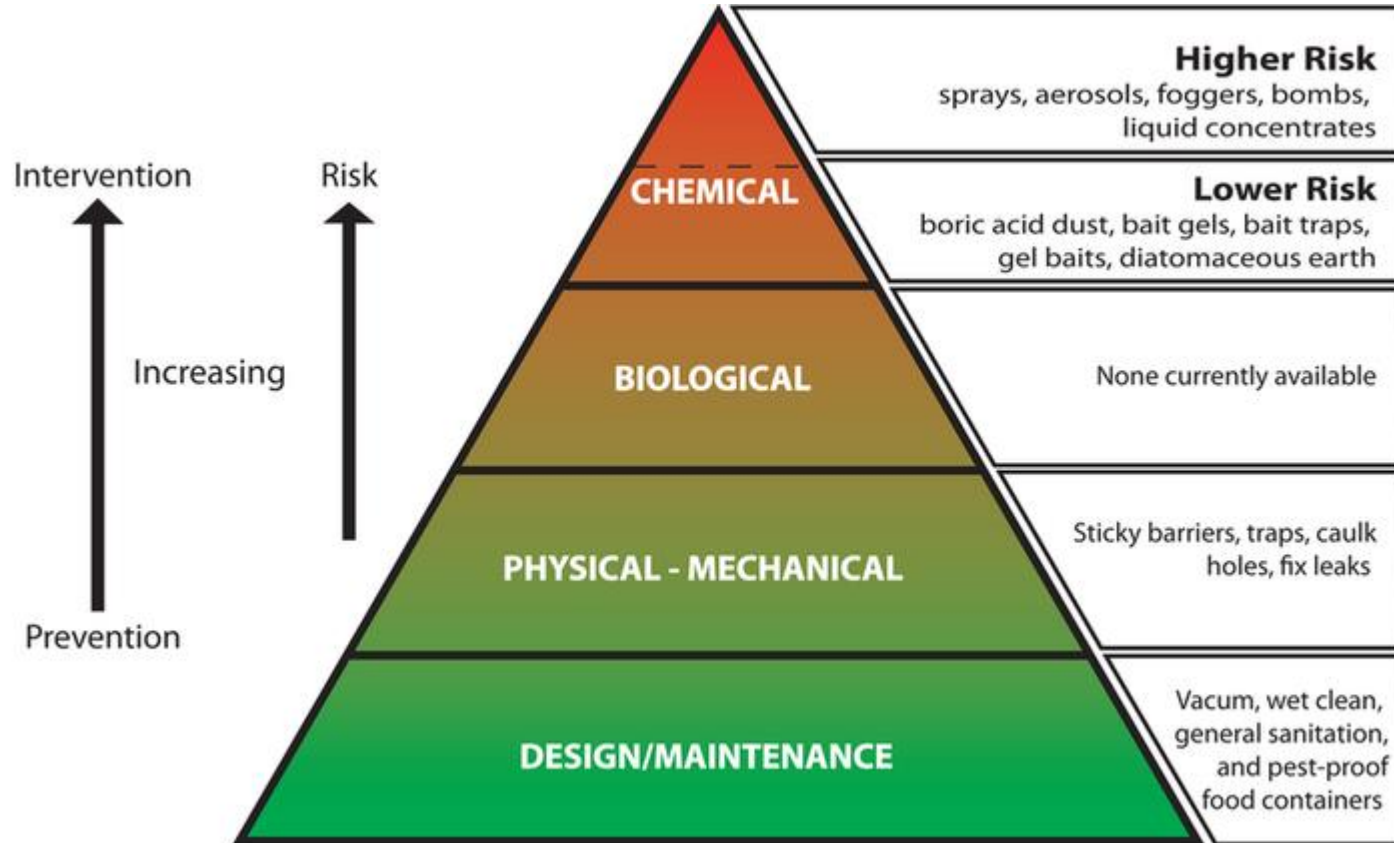


INTEGRATED PEST MANAGEMENT = GREEN

Treating
pest

VS.

Remove
CAUSE



INTEGRATED PEST MANAGEMENT

1. Inspection - Monitoring, thresholds

2. Prevention - Building/landscape design

- **EXCLUSION** - screens, seal gaps, inspect incoming materials
- **SANITATION** - remove food, moisture, infested materials

3. Non-chemical & Trapping Methods

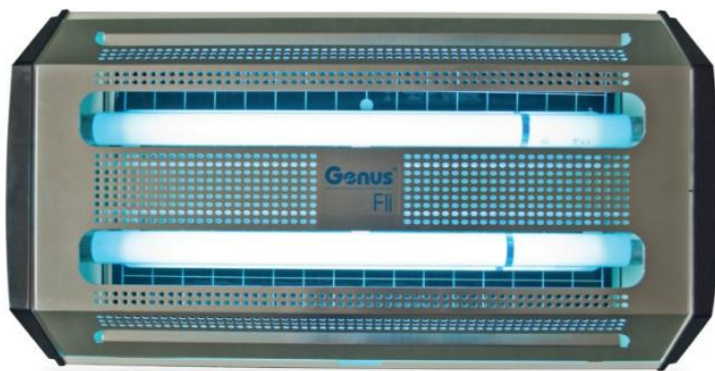
- Mechanical, sticky, lures (pheromones, food, light)

4. Chemical Methods - Lower risk -> Higher risk

5. Considerations - Vary approaches, **“treatment” vs “application”**



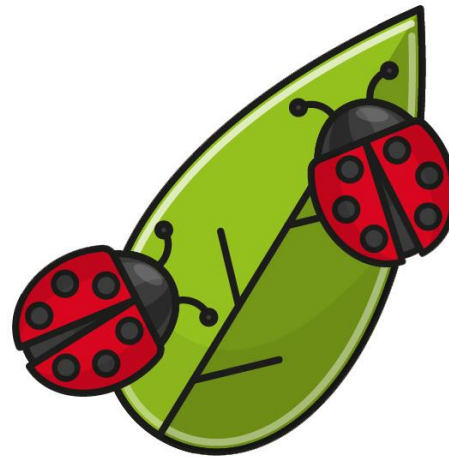
Non-CHEMICAL & TRAPPING METHODS



“GREEN” FIFRA / EPA / VT PRODUCT REGULATION

No

- **Biocontrol** - predators, parasites, pathogens*



“GREEN” FIFRA / EPA / VT PRODUCT REGULATION

Maybe

- **25(b) Minimum Risk Pesticides**
 - Exempt from EPA efficacy and toxicity
 - Must follow certain labelling rules
 - Must be registered for use in Vermont
- **Organic Pesticides**
 - Reviewed by the Organic Materials Review Institute



“GREEN” FIFRA / EPA / VT PRODUCT REGULATION

Yes

- **Biopesticides**
 - May include formulated biocontrols
- **Insect Growth Regulators**
 - Defined as pesticides



“GREEN” FIFRA / EPA / VT PRODUCT REGULATION

Must be **certified** to apply
ANY pesticide commercially
in Vermont

- 25(b) Minimum Risk Pesticides
- Organic Pesticides
- Biopesticides
- Insect Growth Regulators



“GREEN” PESTICIDES

Naturally occurring substances, microorganisms, plant-incorporated protectants (PIPs)

- **Minerals & Inorganic Materials**
- **Soaps**
- **Oils: Plant & Petroleum**
- **Plant Extracts**
- **Microbes** - Bacteria, Fungi, Viruses, Nematodes
- **Insect Growth Regulators**
- **RNAi Pesticides**




PROS	CONS
Work fast (mostly)	Contact required
Low mammalian toxicity Smell good (varies)	Allergic reaction, irritation, asthma Formulation hazard, carrier toxicity Pet hazards (dose, fish, birds)
Few non-target species indoors	Many non-target species outdoors Pollinator, beneficials, phytotoxicity hazards

➔ <https://entomology.rutgers.edu/personnel/changlu-wang/docs/Singh2014Essentialoilsbedbugcontrol.pdf>



PROS	CONS
Consumer availability Easy to use	Commercial availability, cost
Fast breakdown	Short residual (varies)
Resistance rotation option	Resistance possible Unknown mode of action
	Research, Registration, Review
	Consistency

MINERALS & INORGANIC MATERIALS, SOAPS

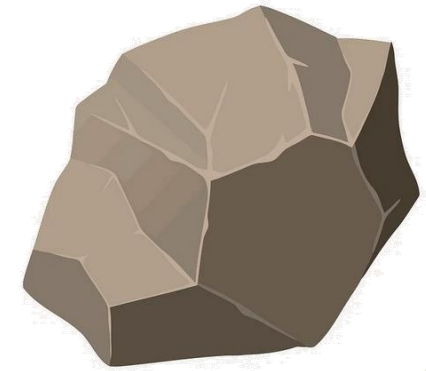
- Sulfur & Copper
- Iron phosphate
- **Diatomaceous Earth**
- Kaolin Clay
- **Boric acid (borax)**
- Potassium bicarbonate
& Sodium bicarbonate (baking soda)
- **Vinegar**
- **Sodium lauryl sulfate (surfactant)**
- Potassium salts of fatty acids
(vs. dish soap) 



MINERALS & INORGANIC MATERIALS

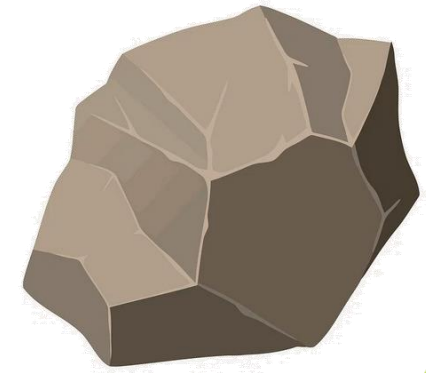
- **Diatomaceous Earth**

- Silica diatom fossils
- Must be completely dry, not practical outdoors
- **Contact required**
 - Abrasive -> removes waxy cuticle -> dehydration
- **DO NOT USE pool grade = inhalation hazard**
- **Harms beneficial insects**



MINERALS & INORGANIC MATERIALS

- **Boric acid (borax)**
 - **Ant bait:** disrupts nervous system, digestion
 - **Not all species affected**
- **Vinegar**
 - **Herbicide:** non-selective
 - Household 5% multiple applications
 - **Commercial 20-30% (corrosive)**



SOAPS

- **Soft-bodied insects, larvae**
 - aphids, soft scales, thrips, spider mites, mealybugs
- **Contact required**
 - Block breathing holes
 - Removes waxy cuticle -> dehydration
- **No residual effect once dry**
- **Phytotoxicity risk (concentrations >1.5%)**
- **Avoid beneficials**



OILS: PLANT & PETROLEUM, PLANT EXTRACTS

- Neem Oil
- Citrus Oil
- Essential Oil
- Horticultural Oil
- Cottonseed Oil
- Azadirachtin
- Pyrethrum/Pyrethrins
- Capsaicin



OILS: PLANT

- **Soft-bodied insects, larvae**
 - aphids, soft scales, thrips, spider mites, mealybugs
- **Contact required**
 - Block breathing holes
 - Suffocate eggs
- **No residual effect once dry**
- **Phytotoxicity risk**
- **Avoid beneficials**
- **Use caution around pets**



OILS: PLANT

- **Citrus Oils**

- Limonene, Linalool
- Nerve poison

- **Essential Oils**

- Peppermint, geraniol (citronella), cinnamon, clove, thyme, rosemary, cedar, lavender, eucalyptus, etc.
- Often combined with other products (pyrethrins, oil)
- Insecticide, repellent, alternate flushing agent



OILS: PLANT

- **Cottonseed Oil**

- Contains gossypol
- Causes infertility in male rats
- **Reversible**

NOTE: conventional birth control products
also available for rats and mice



PLANT EXTRACTS

- **Pyrethrum/Pyrethrins**

- ants, roaches, fleas, flies, ticks, garden pests
- Nervous system paralysis, repellant, flushing agent
 - Combine with synergist to block metabolism/recovery
 - **Do not combine with soap** breaks down

- **Contact required, fast acting**

- **Very short residual activity**

- **Highly toxic to cats, fish**

- **NOTE: Pyrethroids** are synthetic

- Same mode of action
- Longer lasting



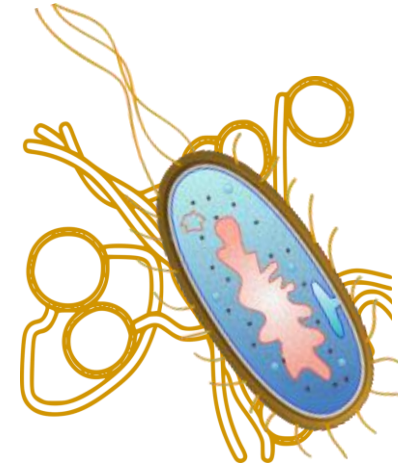
MICROBES

Bacteria

- *Bacillus thuringiensis* (Bt)
- Spinosad
- Milky Spore
- *Chromobacterium*
- *Burkholderia*
- *Streptomyces*

Fungi

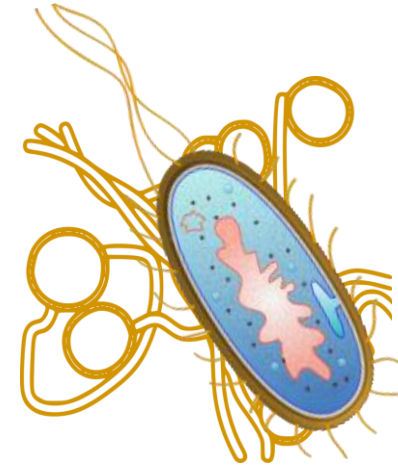
- *Beauveria*
- *Metarhizium*
- *Trichoderma*,
Isaria, *Hirsutella*,
Cordyceps



Viruses & Nematodes

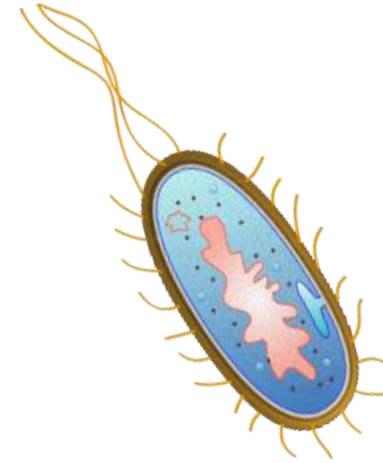
MICROBES

- **Live organisms = formulated biocontrol**
 - Dust, powder, liquid, granules
- **Target-specific**
 - Pest category or life stage
- **Contact or ingestion required**
 - Fungi: moisture, humidity required (spore germination)
- **Sensitive to heat, sunlight, moisture**
 - Special conditions (storage, application)
- **Toxicity, efficacy varies**



MICROBES: BACTERIA

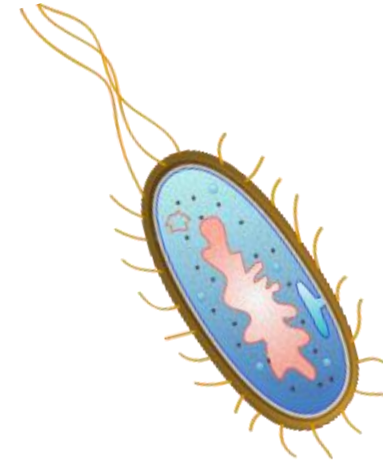
- *Bacillus thuringiensis* (Bt)
 - Different subspecies target different pests
 - ~~*kurstaki*~~: caterpillars
 - *israelensis*: mosquito, black fly, fungus gnats
 - Toxins attack gut, stop feeding, death
- **Frequent applications required**
 - Rapidly broken down by sunlight



MICROBES: BACTERIA

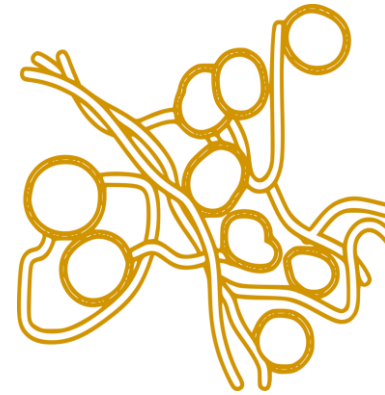
- Spinosad

- *Saccharopolyspora spinosa*
- larvae, thrips, spider mites, flies, beetles, emerald ash borer
- Nervous system toxin
- **Highly toxic to bees when wet**
- **Avoid beneficials**



MICROBES: FUNGI

- *Beauveria*
 - thrips, weevils, whiteflies, mites, ticks, **bedbugs**
 - Spores penetrate and kill
- *Metarhizium*
 - thrips, weevils, whiteflies, mites, ticks
 - Spores penetrate and kill



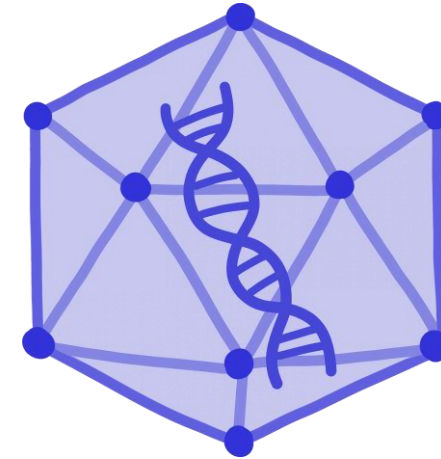
INSECT GROWTH REGULATORS, RNAi

- **Insect Growth Regulators**

- cockroaches, fleas, mosquitos, fruit flies, pantry pests
- Chitin inhibitors, juvenile hormones
- Interfere with molting

- **RNAi Pesticides**

- New technology
- Virus-like mode of action
- Interferes with cell metabolism
- Colorado potato beetle, more?



EPA REDUCED RISK PRODUCTS

- **Conventional**

- Newer chemistries
- Reduced environmental, beneficials impacts



- Ametoctradin
- Chlorantraniliprole
- Chlorfenapyr
- Chlothianidin
- Cyantraniliprole
- Deltamethrin
- Difluubenzuron
- Dinotefuran
- Etofenprox
- Fipronil
- Hexaflumuron
- Lambda-cyhalothrin
- Lufenuron
- Novaluron
- Pyriproxyfen
- Spinosad

➔ <https://www.epa.gov/pesticide-registration/reduced-risk-and-organophosphate-alternative-decisions-conventional>



Considerations



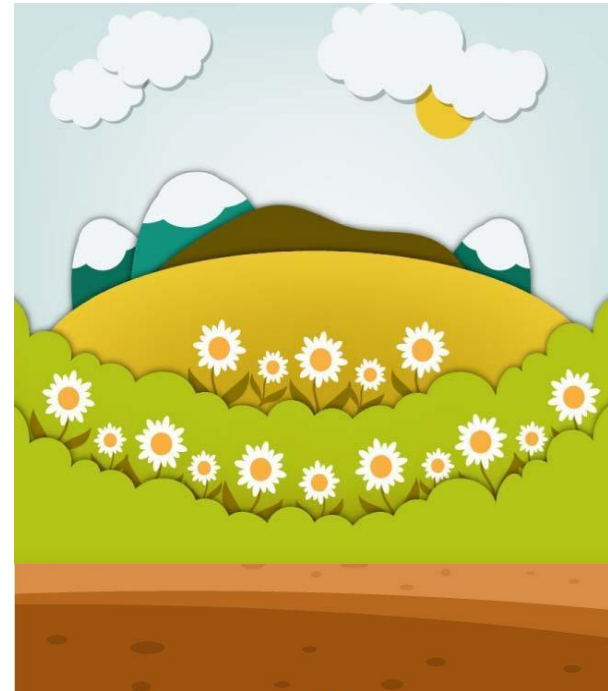
“GREEN” PRODUCT SELECTION

Performance very difficult to quantify or apply universally

USE COMMON SENSE

Beware excessive product claims

Proceed with caution



THINK ABOUT ...

- Determine management goals
- **Research, research, research**
 - product efficacy, toxicity, beneficial effects
- **Read the label and apply properly**
- Test small areas first
- Keep records



Incorporating products into an **overall IPM plan** will **allow for variability** in product performance

wettable dust

Broad Spectrum Insecticide

For Use as a Wettable Powder or as a Dust

Safe and Effective When Used and Stored as Directed

FIFRA 25(b) exempt product

Research-Based Botanical Insecticide

KEEP OUT OF REACH OF CHILDREN

CAUTION



Active Ingredients:

Thyme Oil.....10.0%

2-Phenethyl Propionate.....7.0%

Inert Ingredients.....83.0%

Silica, Wintergreen Oil,
Polyglyceryl Oleate, Isopropyl Myristate

Total.....100.0%

Net Contents:

8 oz or 2 lbs

- **Dust:** Apply at a rate up to 2 oz per 100 sq ft
- **Spray:** Use from $\frac{1}{2}$ cup to 2 cups (1-4 oz) ... per 1000 sq ft

**10x concentration
difference?**



PROTECTING YOURSELF

Personal Protection Equipment (PPE)

- Long-sleeved shirt
- Long pants or coveralls
- **Gloves** - unlined/elbow length
- **Boots** - pant legs over boots
- **Eye Protection**
- **Dust mask or cartridge respirator** - fit test and seal check



GETTING MORE INFORMATION

Getting More Information

- Manufacturers
- Dealers and Salespersons
- Vermont Agency of Agriculture
- Extension Agents
- OMRI Search
- www.domyown.com

Online Label Databases

- www.cdms.net
- agrian.com

Vermont Product Registration Lists

- www.kellysolutions.com
- usaplants.vermont.gov
- agriculture.vermont.gov
- **product-registration**

<http://npic.orst.edu/>



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12:00PM Pacific Time, Mon-Fri


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A-Z Index

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f t y

Where to start with pest control



Have a pesky pest? Curious where to start with pest control? Our new list takes you step-by-step.

What are pests? What are pesticides? Local Contacts



Pesticide Safety Education Program



The UVM Pesticide Safety Education Program (PSEP) works closely with the Vermont Agency of Agriculture, Food & Markets to provide training and education resources for current and prospective pesticide applicators, ensuring proper and legal use of pesticides that reduces potential risk to human health and the environment.

Online Training and Recertification Courses



Resources to help study for pesticide applicator exams and/or to provide recertification credits for certified pesticide applicators. Open to the general public and certified pesticide applicators throughout the Northeast.

[GO TO ONLINE COURSES OVERVIEW](#)


Presented by University of Vermont Extension Pesticide Safety Education Program and the Vermont Agency of Agriculture, Food & Markets.



VERMONT AGENCY OF AGRICULTURE,
FOOD & MARKETS: PESTICIDE PROGRAMS

USA PLANTS

CDMS PESTICIDE LABEL & MSDS
DATABASE

AGRARIAN PESTICIDE LABEL & MSDS
DATABASE

NATIONAL PESTICIDE INFORMATION
CENTER

POISON CONTROL HELPLINE
1-800-222-1222

SPILL REPORTING HOTLINE
1-800-641-5005

Vermont Agency of Agriculture,
Food & Markets: Useful Links

Vermont Pesticide Record Search
(USA Plants)

Fact Sheets & Videos

Annual Reports

CONTACT US

Sarah Kingsley-Richards, M.S.

www.uvm.edu/extension/psep

Vermont Pesticide Education: Category 7A Manual Review (no credit)



This approximately **2.9 hour** course is presented in **ten modules** that provide a review of Category 7a Subcategory Structural and Rodent manual content required to take the Vermont 7A General (Structural) Pest Control pesticide applicator certification category exam. The modules may be viewed at your own pace and full completion is not required. Once enrolled, you will have **FOURTEEN (14) DAYS** to complete the review.

- This course is for anyone wishing a Vermont* 7A General (Structural) Pest Control pesticide applicator license: pest control operators, government or municipal employees, university employees, etc.
- This course is not intended as a substitute for study of the manual and inserts (see list below).
- *This course does not provide recertification credit. Please see related Vermont Pesticide Safety Education course offerings for recertification credits.*

For more information please contact Sarah Kingsley-Richards at sarah.kingsley@uvm.edu.

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VERMONT CATEGORY 7A MANUAL REVIEW, UNIT #1 (1 CREDIT) ▾

VERMONT CATEGORY 7A MANUAL REVIEW, UNIT #2 (1 CREDIT) ▾

VERMONT CATEGORY 7A MANUAL REVIEW, UNIT #3 (1 CREDIT) ▾

VERMONT CATEGORY 7A MANUAL REVIEW, UNIT #4 (1 CREDIT) ▾

VERMONT CATEGORY 7C MANUAL REVIEW (NO CREDIT) ▾

VERMONT CATEGORY 7F MANUAL REVIEW (NO CREDIT) ▾



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