

PESTICIDE SAFETY EDUCATION PROGRAM

# Ohio Pesticide Applicator Study Guide

## Forage Crops & Livestock



# Acknowledgements

We would like to express our appreciation to the individuals listed here for contribution to, or reviewing of the manuscript prior to publication:

Ron Hammond, Department of Entomology, The Ohio State University  
Clif Little, Ohio State University Extension  
Gene McCluer, Ohio State University Extension  
Mark Mechling, Ohio State University Extension  
Jeff McCutcheon, Ohio State University Extension  
Diana Roll, Ohio Department of Agriculture  
Marc Sulc, Department of Horticulture & Crop Science, The Ohio State University

## **Pesticide Safety Education Program Ohio State University Extension**

<http://pested.osu.edu>

(614) 292-4070

### **Bulletin 821 - 2**

Copyright © 2012, The Ohio State University

Ohio State University Extension embraces human diversity and is committed to ensuring that all research and related educational programs are available to clientele on a nondiscriminatory basis without regard to age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, sexual orientation, or veteran status. This statement is in accordance with United States Civil Rights Laws and the USDA.

Keith L. Smith, Associate Vice President for Agricultural Administration; Associate Dean, College of Food, Agricultural, and Environmental Sciences; Director, Ohio State University Extension; and Gist Chair in Extension Education and Leadership.

For Deaf and Hard of Hearing, please contact Ohio State University Extension using your preferred communication (e-mail, relay services, or video relay services). Phone 1-800-750-0750 between 8 a.m. and 5 p.m. EST Monday through Friday. Inform the operator to dial 614-292-6181

Revised 4/12

# **PESTICIDE SAFETY EDUCATION PROGRAM**

## **Ohio Pesticide Applicator Forage Crops and Livestock Student Workbook**

### **Edited by:**

Joanne Kick-Raack, State Director  
Pesticide Safety Education Program

Cindy Folck, Program Manager  
Pesticide Safety Education Program

Dennis Mills, Private Applicator Programs  
Pesticide Safety Education Program

Jennifer Hill, Program Assistant  
Pesticide Safety Education Program

# **Ohio Private Pesticide Applicator Forage Crops & Livestock Study Guide**

## **Table of Contents**

Overview of Forage Crops & Livestock Study Guide .....	page 5
How to Use this Study Guide .....	page 5
Preparing for the Exam.....	page 5
Forage Crops & Livestock Exam Outline .....	page 6
Forage Crops & Livestock Introduction .....	page 10
Forage Crops Pest Management .....	page 12
Livestock Pest Management .....	page 28
Score Card .....	page 36
Forage Crops Label - Insecticide X .....	page 38
Livestock Label - Fly Be Gone EC .....	page 42
Pest Color Images .....	pages 46-47

# **Overview of Private Forage Crops & Livestock Study Guide**

This workbook was prepared by Ohio State University Extension for use as a self-study guide or in combination with an educational program. It has been developed to assist pesticide applicators in better preparing themselves for taking the Private Applicator Forage Crops & Livestock Exam required for certification in Private Applicator Category 2.

The sample questions presented in this study guide will help the reader obtain a general understanding of forage crop and livestock pest problems, approaches to control, and information needed in order to apply and use pesticides safely.

## **How to Use this Study Guide**

The Ohio Pesticide Applicator Forage Crops & Livestock Study Guide (OSU Bulletin 821-2) includes questions to help lead you through an overview of general forage crop and livestock topics and give you practice in answering multiple-choice questions. Here are some steps to help you utilize this study guide:

1. Work through each unit, using a piece of paper to conceal each page of answers.
2. Mark the response you feel is correct and continue with the next question until you complete that page.
3. Once you have answered all of the questions on that page, look at the next page and check to see if your responses were correct.
4. Read the explanation for each question, as important information is provided in these paragraphs.
5. Some questions will refer to the sample pesticide labels found at the back of the study guide.

## **Preparing for the Exam**

An emphasis of the Private Applicator Forage Crops and Livestock Exam is reading and understanding the label. Parts and concepts of the label are addressed in all areas of the exam. Applicators should understand the importance of reading the label and how it relates to all aspects of pesticide application. A brief overview of the important concepts and issues addressed on the exam is presented here.

# Forage Crops and Livestock Exam Outline

To help applicators prepare for the Forage Crops and Livestock Exam, the following is a brief outline of the important concepts addressed on the exam. Pesticide applicators will need to have a general pesticide knowledge and be familiar with the major pests of forage and livestock in Ohio. The emphasis of the forage and livestock exam reflects the crops grown and livestock raised in Ohio. A brief overview of the important forage crops, livestock, pests, and issues addressed on the exam is presented here. Each of these topics is covered in the overview and practice questions in this study guide.

---

## Ohio Forage Crops and Livestock

*(ranked in order of emphasis on exam)*

---

1. Alfalfa
2. Pasture
3. Poultry
4. Dairy/Confined Livestock Feeding Operations

---

## Pest Problems

*(ranked in order of emphasis on exam)*

---

1. Insects/insecticides
2. Weeds/herbicides
3. Diseases/fungicides
4. Birds/avicides

---

## General Pesticide Topics for Forage Crops and Livestock

---

### Resistance Management

Applicators should be able to:

- Understand how resistance develops from continued use of a single pesticide group and/or mode of action
- Understand the use of plant varieties that are resistant to certain diseases and insects

## **Integrated Pest Management (IPM)**

Applicators should be able to:

- Identify scouting and monitoring methods for pest populations
- Define economic thresholds
- Know what cultural controls could improve plant health and reduce pesticide use
- Identify mechanical controls such as timing of forage cutting
- Understand the use of biological controls such as parasitic wasps
- Understand the use of sanitation methods to control pests in livestock operations

## **Safe, Accurate Applications**

Applicators should be able to:

- Understand label instructions for set-backs, soil considerations, and endangered or sensitive species like bees
- Be able to calculate tank mixtures and/or application rates from the label
- Identify various application methods

## **Reading pesticide labels**

Applicators should be able to read several labels and locate information on, such as:

- Setbacks/buffers
- Restricted Entry Interval (REI)
- Pre-Harvest Interval (PHI)
- Environmental hazards
- Maximum-use rates
- Crop and application restrictions
- Days to slaughter restrictions
- Lactation restrictions

---

## Primary Pests of Ohio Forage Crops

---

### Insects and Insecticides

Applicators should be able to identify the insect and the crop damage caused by:

- Alfalfa weevil
- Potato leafhopper

Applicators should be able to:

- Understand the mechanical control of forage cutting to control alfalfa weevil
- Identify scouting techniques and economic threshold for potato leafhopper
- Know the biological control of alfalfa weevil in Ohio
- Describe use of forage and alfalfa varieties resistant to certain insects

### Weeds and Herbicides

Applicators should be able to identify these common weeds:

- Canada thistle
- Chickweed
- Seedling curly dock
- Dandelion
- Quackgrass
- Multiflora rose

Applicators should be able to:

- Distinguish between a grassy and broadleaf weed
- Describe importance of controlling invasive weeds
- Understand the general timing of herbicide control of weeds based on life cycle (perennial, summer annual, or winter annual)
- Know importance of stand establishment for weed control

### Disease and Fungicides

Applicators should be able to:

- Identify cultural practices to control diseases in forages such as use of proper fertilization, drainage, and crop rotation
- Describe the use of forage and alfalfa varieties resistant to certain diseases



---

## Primary Pests of Ohio Livestock

---

### Confinement Feeding Operations (Dairy, Poultry, Livestock)

Applicators should be able to:

- Identify sanitation IPM strategies for confined operations
- Understand fly management in a confined facility
- Compare residual to knockdown insecticides for fly management
- Identify the differences between a horn fly and a house fly
- Describe pest management for manure storage and application
- Know IPM strategies and pesticide control methods for nuisance birds

### Pasture Grazing Operations

Applicators should be able to:

- Identify sanitation IPM strategies for feeding and corral areas
- Understand fly management for pasture areas

**Note:** *This summary is meant to guide users to key areas to study for the forage crops and livestock exam. Most knowledge areas on the exam were addressed at the time of printing. However, practices, products, and therefore versions of the exam change and may not be completely reflected in this manual.*

# Forage Crops & Livestock

## Private Applicator Category 2

*Following are some concepts of pest control in forage crops and livestock operations. Specific information that the applicator needs to study for the exam will be covered in the study test questions in this study guide.*

Private Applicator Category 2 covers pesticide application to forage crops and livestock. The exam focuses on the broad pest management concepts involved with forage crops and livestock production. The technical information applicators need to know for the exam is covered in this study guide.

The forage portion of the exam focuses on the forage crops grown in Ohio, such as alfalfa. The forage portion also includes pasture for grazing situations. A healthy and vigorous forage crop and pasture will have fewer pest problems. Pest management in forage crops includes control of weeds, insects, and diseases that would reduce yields or cause economic loss of the crop.

The livestock portion of the exam for pesticide applicators in Ohio covers broad pest management concepts for confined facilities for poultry, dairy, and others. This also includes applications to the livestock buildings and surrounding areas to control insect and nuisance bird pests. The livestock portion will also look at concepts for controlling pests on grazing livestock and feeding and corral areas in pastures.

### Studying for the Exam

Following are some general terms and concepts that applicators should know related to forage crops and livestock. Additional pest management and pesticide application information are part of the study test questions in the next few sections of the study guide.

### Integrated Pest Management (IPM)

Integrated pest management is a planned strategy that utilizes appropriate combinations of pest control that is economically and environmentally sound. It involves identifying pests, determining the need for control methods and choosing the appropriate combination of control methods for the situation.

IPM Methods Include:

*Cultural* - changing conditions such as crop rotation, fertilization and proper drainage. Also, using resistant varieties is one of the key cultural strategies to control certain insects and diseases in forages.

*Sanitation* - eliminating an environment that encourages pest reproduction to help control the pest population. For example, fly larvae thrive in a moist, dark environment. Cleaning up manure and spilled feed around a feeding area will reduce potential sites for the fly to lay eggs that eventually develop into adult flies.



*Biological* - use of natural enemies to control a pest. An example in forage crops is using a parasitic wasp that feeds on insect pests for control.

*Mechanical* - mowing or tilling to remove weeds or using physical barriers, such as screens for flies, are examples of mechanical control. Properly timing forage cutting to control insect pests is another mechanical control.

*Chemical* - pesticides are part of an IPM program. Pest identification, monitoring, and determining thresholds are important steps needed to determine if pesticides are necessary to control the pests.

## Thresholds

Pest control thresholds may be based on aesthetic health or economic considerations. The **threshold** is determined and set when the potential damage from the pest would exceed the ability or cost to control the pest. The **economic threshold** is set at a point where if the pest is not controlled, there would be economical loss to the crop or animal that exceeds the cost of control.

## Resistant Varieties in Forages

There are some varieties of alfalfa and forages that are bred to be resistant to forage insects and diseases. Planting these varieties will help reduce the amount of insecticides and fungicides used in the forage crop.



## Pesticide Resistance

Using the same pesticide or same group of pesticides repeatedly may cause insect, disease, or weed populations to develop resistance. Each time the pesticide is used, it selectively kills the most susceptible individuals in the population. In any population, some individuals are naturally able to withstand its effects. These survivors may be able to pass along this trait to survive the pesticide to their offspring. Continued use of the same pesticide may allow the resistant offspring to multiply. This phenomenon is known as pesticide resistance.

## Sample Test Questions

The next few sections in this study guide contain study test questions. The sample test questions presented in this study guide will help the reader obtain a general understanding of the concepts of pest management and pesticide application for the private forage crops and livestock category. This format will also provide practice in answering multiple-choice questions, but different questions will appear on the exam.

# Forage Crop Pest Management

## Integrated Pest Management (IPM)

1. Integrated Pest Management does **NOT** include:
  - a. The use of natural enemies of the pest
  - b. The use of pesticides
  - c. Scouting crops to look for pests
  - d. Reading newsletters instead of scouting
2. An economic threshold for application of an insecticide is when the:
  - a. Cost of potential damage would exceed the cost of pest control
  - b. Price of the crop minus expenses
  - c. Economic sustainable alternatives have become established
  - d. Crop needs to be abandoned
3. Scouting forage crops includes:
  - a. Accurately recording field observations
  - b. Recording the stage of crop development
  - c. Determining the pest population
  - d. Determining the amount of crop damage present
  - e. All of the above
4. Forage cultural practices include:
  - a. Crop rotation
  - b. Introduction of predatory pests
  - c. Variety selection
  - d. Using a fungicide to control a disease
  - e. Both a and c
5. Pesticide resistance develops from:
  - a. Rotating pesticide groups
  - b. Using resistant alfalfa varieties
  - c. Continuous use of the same pesticide
  - d. None of the above

# Forage Crop Pest Management - Answers

## Integrated Pest Management (IPM)

**1. Correct answer: D**

Explanation: Keeping updated with current crop situations through reputable newsletters is a helpful tool but, nothing replaces careful scouting of your crops to identify pests that may damage crops. Integrated Pest Management (IPM) also includes biological controls such as using natural enemies of pests and chemical controls when thresholds are reached.

**2. Correct answer: A**

Explanation: An economic threshold is when the cost of potential damage to the crop would exceed the cost of pesticide applications to control the pest. Pest control thresholds may be based on health or economic considerations. Specific thresholds for pests are available to look up in OSU Extension bulletins.

**3. Correct answer: E**

Explanation: Pest management decisions are based on field monitoring of pest populations and the crop's development. When scouting, the pest needs to be identified and the population levels recorded. The stage of the crop needs to be observed because potential damage may depend on whether the crop is near maturity. The amount of crop damage, or potential crop damage, needs to be observed to determine when control is needed.

**4. Correct answer: E**

Explanation: Cultural practices are used to manage the crop to prevent pests from becoming a threat. In a forage crop, this includes rotating between different crops, selecting pest-resistant varieties, and planting pest-free seed. These control methods can be very effective and cost-efficient and present little or no risk to people or the environment.

**5. Correct answer: C**

Explanation: When the same pesticide or same group of pesticides are used repeatedly, insect, disease or weed populations may develop resistance. Each time the pesticide is used, it kills the most susceptible individuals in the population. Some individuals are able to withstand its effects. These survivors may be able to pass along this trait to their offspring. Continued use of the same pesticide may allow the resistant offspring to multiply. This phenomenon is known as pesticide resistance.

## Insect Management

6. What insect is considered the most serious threat to forages?
- Spittlebug
  - Potato leafhopper
  - Alfalfa weevil
  - Asian lady beetle

7. Yellowing on the tips of alfalfa leaves in mid-summer is most likely caused by:
- Potato leafhopper
  - Alfalfa weevil
  - Cutworm
  - Clover worm



Dr. Ron Hammond, The Ohio State University

8. Damage from potato leafhopper is best assessed by:
- Visual checks of the field
  - Monitoring southwesterly weather fronts
  - Using a sweep net
  - Counting feeding scars on alfalfa leaves
9. How can potato leafhopper feeding activity be reduced?
- A timely harvest
  - Choosing potato leafhopper resistant alfalfa varieties
  - Application of an insecticide
  - All of the above
10. When using alfalfa varieties that are resistant to potato leafhopper, what is the economic threshold for an insecticide application to control potato leafhopper?
- No insecticide will be needed
  - Use the same threshold as conventional varieties
  - Thresholds should not be used
  - The threshold will be higher than three-fold the conventional threshold

## Insect Management

**6. Correct answer: B**

Explanation: Heavy potato leafhopper (PLH) infestations will stunt alfalfa stand development, especially the early development of new stands and regrowth following harvest. Excessive stress on alfalfa due to PLH feeding activity may reduce yield of both the current cutting and following cuttings. In addition, stunted and unhealthy alfalfa results in a less competitive crop, which leads to weed invasion.

**7. Correct answer: A**

Explanation: Potato leafhopper is a sucking insect that prevents normal flow of the nutrients in the plant. This causes the leaf tips of alfalfa to yellow in a wedge-shaped pattern. (This is commonly called hopper burn and may be confused with boron deficiency symptoms.) The alfalfa plants will be stunted, resulting in yield loss.

**8. Correct answer: C**

Explanation: Growers need to use a standard sweep net to assess potato leafhopper (PLH) population. When sampling alfalfa, take sweeps from several locations in a field. Skim the alfalfa plants to collect the PLH adults and larvae. Inspect the contents of the catch and count the number of PLH adults and nymphs. OSU bulletins will have information on threshold levels.



**9. Correct answer: D**

Explanation: The delayed harvesting of alfalfa stands increases potato leafhopper (PLH) populations because more of the nymphs are able to reach adult stage and reproduce. A timely harvest will reduce PLH populations. There is more time for PLH to build to high levels when only three cuttings are done per season compared to four cuttings. Using resistant varieties and timely insecticide applications along with a regular harvesting schedule will help reduce potato leafhopper populations.

**10. Correct answer: D**

Explanation: Thresholds are when the potential damage from the pest would exceed the ability or cost to control the pests. The potato leafhopper resistant varieties will provide control unless the potato leafhopper population gets too large. Because of this, field scouting is important for both resistant and regular varieties. Insecticide treatment is needed on regular varieties when sweep net sampling shows high levels of potato leaf hopper activity. For resistant varieties rated greater than 50% resistant to PLH, the economic threshold is increased three-fold over regular variety stands.



11. The failure of alfalfa plants to regrow after first cutting can be caused by:

- a. Alfalfa aphids infestation
- b. Spring black stem disease
- c. Alfalfa weevil feeding
- d. Spittlebug damage

12. The early spring alfalfa pest pictured here is:

- a. Alfalfa weevil
- b. Meadow spittle bug
- c. Lady beetle
- d. Potato leafhopper



Dr. Ron Hammond, The Ohio State University

13. When should an insecticide be used to manage alfalfa weevil?

- a. When adult weevils are seen in the spring
- b. When larval feeding is observed
- c. When parasites and fungal pathogens are not keeping the weevil under the economic threshold
- d. All of the above

14. Defoliation injury to alfalfa is most likely caused by:

- a. Aphids
- b. Weevils
- c. Leafhoppers
- d. Leafminers

15. What control strategy reduces alfalfa weevil populations with parasitic wasps and fungal pathogens?

- a. Perennial
- b. Biological
- c. Chemical
- d. Both b and c

16. An example of cultural control for alfalfa weevil is:

- a. Applying an insecticide without scouting
- b. Applying an insecticide following scouting
- c. Early harvest of 16 inches or higher alfalfa with multiple larvae per stem
- d. Both b and c



**11. Correct answer: C**

Explanation: Foliar injury generally occurs on the first cutting when there is heavy feeding activity by the larvae. Alfalfa weevil feeding and defoliation may prevent forage regrowth, requiring a stubble spray to allow the plants to regrow.

**12. Correct answer: A**

Explanation: Adults of alfalfa weevil are long-snouted beetles called weevils. The young are green “wormlike” larvae that do most of the feeding. The larvae become a resting pupae and then an adult.

**13. Correct answer: C**

Explanation: Biological parasites and fungal pathogens that occur naturally in the field tend to keep alfalfa weevil populations down. But, when the economic threshold is reached, an insecticide may be used to manage the weevil. The decision to apply a foliar insecticide should be based on the actual count of larvae per stem. The detection of one or more larvae per stem on 12 inches or less alfalfa, indicates the need for a rescue treatment. When alfalfa is 12-16 inches in height, the threshold should be increased to 2 to 4 larvae per stem. When alfalfa is 16 inches or more in height and multiple larvae are found per stem, early harvest should be considered.

**14. Correct answer: B**

Explanation: Both the alfalfa weevil adult and larva feed on alfalfa foliage. Foliar-feeding injury by the adult is not significant. However, weevil larvae begin feeding on the alfalfa growing tips and may extensively defoliate the plant. In general, the damage occurs on the first cutting of alfalfa, however, during periods of heavy weevil activity, early growth of the second cutting may be impacted.

**15. Correct answer: B**

Explanation: Over the past few decades, populations of alfalfa weevil have been somewhat biologically controlled by parasitic wasps and a fungal pathogen that occur naturally. The combined effects of these biological controls have reduced crop injury in Ohio.

**16. Correct answer: C**

Explanation: Cultural controls do not include insecticides. Early harvest will help to control alfalfa weevil. Following early harvest of infested stands, regrowth should be examined. If regrowth has two or more larvae per crown and alfalfa is stunted, a stubble spray is warranted. In years when alfalfa weevil have been abundant on first cutting, the regrowth should be checked after cutting to make sure that new adults or larvae are not preventing the plant from regrowing. This cultural control of alfalfa larvae will help reduce populations.

## Weed Management

17. Weed control is important in forages because weeds will:
  - a. Compete with forages for light, water and nutrients
  - b. Reduce nutritional content of the forages when harvested
  - c. Increase drying time of hay
  - d. All of the above
18. When is control of perennial weeds in forages most effective?
  - a. Before crop establishment
  - b. In summer
  - c. In spring
  - d. When alfalfa is 6 inches tall
19. Which of the following affects weed control in forage crops?
  - a. Fertilization
  - b. Time of harvest
  - c. Rainfall
  - d. All of the above
20. To reduce weed pressure in a new forage seeding, when is the optimum timing for planting?
  - a. Late Winter
  - b. Early Spring
  - c. Late Summer
  - d. Mid-Fall
21. What conditions would favor invasive weed problems in an established forage stand?
  - a. Older, thinning stand
  - b. Spotty, uneven growth in some field areas
  - c. Weed pressure from field edges
  - d. All of the above
22. How should weed control in established alfalfa stands be accomplished?
  - a. Timely harvest
  - b. Opting for nonselective herbicides
  - c. Using selective herbicides
  - d. Both a and c

## Weed Management

**17. Correct answer: D**

Explanation: Weeds reduce forage yields, but more importantly often reduce forage quality and palatability. Weeds could also affect timeliness and quality of baling.

**18. Correct answer: A**

Explanation: Managing weeds in forages begins before establishment of the crop. Perennial, broadleaf and grassy weeds are much easier to manage prior to planting a forage crop. If these weeds are not controlled before seeding, they commonly persist throughout the life of the forage.

**19. Correct answer: D**

Explanation: Fertilization keeps the forage stand healthy and able to choke out weeds that may germinate. Timely cutting of forages will help reduce weed growth. Rainfall influences the activity of herbicides applied and also promotes a healthy stand.

**20. Correct answer: C**

Explanation: In Ohio, late summer planting of forages helps avoid competing weeds. Late winter and early spring planting are sometimes easily overcome by the weeds that grow in the spring and summer. Winter annuals tend to out-compete forages seeded in the fall.

**21. Correct answer: D**

Explanation: A dense, healthy forage stand is the best weed control in an established field. Weeds will develop in an old stand where the legumes are beginning to thin or in areas where legume growth is not healthy and weeds can out-compete the plants. Field edges are vulnerable to invasive weeds that spread from fencerows, ditches or another field. Spot spraying might be necessary to control this weed pressure.

**22. Correct answer: D**

Explanation: Weed control at establishment or in the seedling year is most critical for maintaining a healthy forage stand. The best weed control in an established forage stand is achieved by maintaining a dense, healthy stand through proper fertilization, cutting management, and insect control. Harvest management can be used to reduce the impact of weeds. Good quality alfalfa can be harvested if three or more cuttings are made on a 35 to 40 day schedule. When weeds are present or persist in spite of good management, herbicides can help improve yield and quality. The proper identification of the broadleaf or grassy weed and the use of the proper selective herbicide is important in established stands of alfalfa. Non-selective herbicides, that kill all vegetation, would only be used as a burndown prior to establishing the forage seeding.

23. To control chickweed and other winter annuals, an herbicide application could be made when the alfalfa is:
- Actively growing
  - Blooming
  - Ready for first cutting
  - Dormant
24. Annual weeds in pastures should be mowed:
- Prior to flowering
  - After flower has turned to seed
  - When weed begins to die
  - All of the above
25. What is the most effective control of perennial weeds in a pasture?
- Herbicides
  - Mowing
  - Plowing
  - Both a and b
26. Which of the following are control measures for multiflora rose?
- Animal grazing
  - Mechanical control
  - Use of herbicides
  - All of the above
27. Identify this aggressive, creeping perennial weed that reproduces from underground rhizomes.
- Canada thistle
  - Giant ragweed
  - Smartweed
  - Dandelion
28. Identify this winter annual weed that grows as a large mat of foliage.
- Henbit
  - Chickweed
  - Giant ragweed
  - Dandelion



- 23. Correct answer: D**  
Explanation: Herbicides used to control broadleaf weeds, such as chickweed, could also damage alfalfa. Winter annuals germinate in the fall and are actively growing when the alfalfa is dormant. Applications can be done in the fall and spring during alfalfa's dormant period.
- 24. Correct answer: A**  
Explanation: Annual weeds in pastures should be mowed prior to or immediately after flowering to prevent the production of viable seed. The production of seeds will extend the weed problem into the next growing year.
- 25. Correct answer: D**  
Explanation: A combination of mowing and herbicides will help with perennial weed control. Mowing in mid-summer removes weed growth from the first half of the season, and prevents seed production by many annuals and biennials. Mowing also removes the initial growth of some perennials. Herbicide applications are most effective in the fall for perennial weeds.
- 26. Correct answer: D**  
Explanation: Multiflora rose cannot be eradicated by a one-time effort. Mechanical control requires removing plants from the soil or repeated defoliation by mowing. Herbicides can be applied as a foliar spray, a dormant basal bark treatment, or soil application. Herbicides may not result in total plant kill; therefore a combination of chemical and mechanical methods offers the best results. Grazing by goats or sheep can be used to control multiflora rose, especially on steeper slopes.
- 27. Correct Answer: A**  
Explanation: Canada thistle is an aggressive, creeping perennial that re-grows from underground stems (rhizomes) and from seeds. Its extensive underground system makes it difficult to control. This is a weed that needs to be controlled with a nonselective burndown treatment prior to seeding. If not controlled pre-plant, the next best time to treat Canada thistle with herbicides is after the first flower buds are formed and before the first flowers open.
- 28. Correct Answer: B**  
Explanation: Chickweed is a broadleaf winter annual that grows as a large mat of foliage, which can be highly competitive with alfalfa and lower the quality of the forage, especially for the first cutting. Winter annuals germinate in the fall or winter and grow and bloom during the spring, when many other plants are just beginning to germinate.

29. Identify this perennial weed that can lower protein quality of forage.

- a. Dandelion
- b. Lambsquarters
- c. Curly dock
- d. Chickweed



30. Identify this perennial, grassy weed that reproduces by underground rhizomes.

- a. Nutsedge
- b. Orchardgrass
- c. Ragweed
- d. Quackgrass



31. Identify this perennial weed with a bright, yellow flower, and long taproot.

- a. Ragweed
- b. Dandelion
- c. Lambsquarter
- d. Henbit



32. Identify this perennial, woody plant commonly found in pastures.

- a. Canada thistle
- b. Multiflora rose
- c. Poison hemlock
- d. Wild parsnip



## Disease Management

33. Which of the following helps disease control in forages?

- a. Selecting resistant varieties
- b. Drainage improvement and crop rotation
- c. Proper fertilization
- d. All of the above

**29. Correct Answer: C**

Explanation: Curly dock is a perennial broadleaf weed that has one-half of the protein level of alfalfa, which lowers the quality of the forage. It needs to be controlled with a nonselective burndown treatment prior to seeding. Curly dock reproduces by seeds and underground rhizomes, which makes it difficult to control.

**30. Correct Answer: D**

Explanation: Quackgrass is a perennial grass that reproduces by seed and underground rhizomes. It needs to be controlled with a nonselective burndown treatment prior to seeding. Quackgrass competes with forages and reproduces by underground rhizomes, which makes it difficult to control.

**31. Correct Answer: B**

Explanation: Dandelion is a perennial broadleaf weed that reproduces from seed or tap roots and needs to be controlled with a nonselective burndown treatment prior to seeding. Dandelions dry more slowly than hay, which could delay baling. Perennial weeds, such as dandelion persist year after year, which makes them difficult to control.

**32. Correct Answer: B**

Explanation: Woody perennials, such as multiflora rose, can be difficult to control. Just using mechanical control, such as mowing, will not prevent the plant from resprouting and spreading through rhizomes and creeping roots. These perennials are most susceptible to herbicides during the bud to bloom stage. This is when the sugars and food produced by the plant are moving to the roots. The herbicide moves downward with the food to kill the underground reproductive parts rather than just the top of the plant.

## **Disease Management**

**33. Correct answer: D**

Explanation: Disease control in forages is attained by growing a healthy crop, selecting resistant varieties, improving field drainage and using crop rotation to avoid carryover of fungi surviving in the soil.

34. What is a disease resistant variety?
- a. A plant that is immune to the pathogen and will show no symptoms
  - b. A plant that will show reduced symptom development
  - c. A plant that is immune to only certain races or strains of the pathogen
  - d. Both b and c
35. Which of the following is **NOT** a cultural practice that will help control diseases in alfalfa?
- a. Proper fertility and pH
  - b. Planting in well drained soil
  - c. Insecticide application
  - d. Variety selection
36. What is the best method of disease control in alfalfa?
- a. Resistant varieties
  - b. Winter hardiness
  - c. High yielding varieties
  - d. Seed treatment

#### **Label and Law**

37. Which of the following is **NOT** an applicator precaution to protect honey bees from pesticides?
- a. Use a pesticide with low bee toxicity
  - b. Only spray in the early morning or late evening
  - c. Alert registered beekeepers prior to spraying
  - d. Spray only during noontime hours
38. If you apply Insecticide X to an alfalfa field on Monday, when will you be able to mow the alfalfa to eventually bale for hay? (*See label in back of study guide.*)
- a. Tuesday
  - b. Saturday
  - c. One week from Tuesday
  - d. Two weeks from Tuesday
39. You are planning to spray a 20-acre alfalfa field for potato leafhopper. How many ounces of Insecticide X will you use? (*See label in back of study guide.*)
- a. 0.5 oz.
  - b. 11 oz.
  - c. 32 oz.
  - d. 64 oz.



**34. Correct answer: D**

Explanation: Disease control in alfalfa is best accomplished by planting resistant varieties. These varieties will have genetic resistance to certain disease pathogens attacking the crop. The resistant varieties will be immune or show less damage from disease compared to regular varieties. Disease fungi can have different “races” or strains of a pathogen and not all varieties are resistant to all races.

**35. Correct answer: C**

Explanation: Alfalfa requires deep, well drained soils with near neutral pH and high fertility for high yields. It should not be grown on soils with moderate to poor drainage. Alfalfa has good seedling vigor and excellent drought tolerance when kept healthy. Insecticide applications are a chemical, not cultural control.

**36. Correct answer: A**

Explanation: Improvements in alfalfa varieties include resistance to many diseases. These new varieties provide higher yields and greater stand persistence than older varieties with less disease resistance. The new varieties also have improved forage quality and some varieties have high levels of resistance to potato leafhopper.

**Label and Law**

**37. Correct answer: D**

Explanation: Honey bees forage during the peak of the day. Applications that have labels with a bee advisory should be done during the evening or early morning. Applications should not be done to flowering crops. According to Ohio pesticide law, if a pesticide is toxic to bees, it is the applicator’s responsibility to contact the beekeepers with registered apiaries (beehives) within ½ mile of the application site at least 24 hours before application.

**38. Correct answer: C**

Explanation: Pre-harvest intervals (PHI) are the minimum number of days that must pass between the last application of a pesticide and the harvest of crops or the slaughter of animals. The PHI for Insecticide X is seven days for hay. So, you would need to wait seven days before mowing for hay.

**39. Correct answer: C**

Explanation: The label states that when spraying for leafhopper species, the rate range is 0.96 - 1.60 fluid ounces/acre. The field is 20 acres, so the fluid ounce rate is multiplied by 20. The rate is a range, so figure both ends of the range:

Low Rate: 0.96 fl. oz./acre x 20 acres = 19.2 fl. oz.

High Rate: 1.60 fl. oz./acre x 20 acres = 32 fl. oz.

The answer would be in the range of 19.2 fl. oz. to 32 fl. oz.

40. What is the REI for Insecticide X? (*See label in back of study guide.*)
- a. 12 hours
  - b. 24 hours
  - c. 48 hours
  - d. 60 hours
41. When applying Insecticide X to an alfalfa field, what precautions should be taken? (*See label in back of study guide.*)
- a. Avoid spraying creeks or ponds
  - b. Avoid spraying 90 feet from fencerows
  - c. Keep sprayer pressure extremely high for application
  - d. No precautions are needed

**40. Correct answer: B**

Explanation: Restricted entry interval (REI) – is the amount of time that must pass before people can re-enter an area treated with a pesticide. Restricted entry intervals are established to limit the exposure of pesticide residues to workers or other persons not involved in the application of a pesticide. The REI information is listed in the Agricultural Use Requirement section for crop uses or under the specific crop or site on the pesticide label. The REI for Insecticide X is 24 hours.

**41. Correct answer: A**

Explanation: The Insecticide X label has precautions in the Environmental Hazards section, which states the pesticide is extremely toxic to fish and aquatic organisms. The label says, “Do not apply directly to water.”

# Livestock Pest Management

## Insect Management

1. Reducing manure and eliminating spilled feed is an example of what IPM method?
  - a. Cultural
  - b. Biological
  - c. Mechanical
  - d. Sanitation

2. Space sprays or aerosols are most effective for:
  - a. Residual control of flies
  - b. Rapid knockdown of adult flies
  - c. Rapid kill of fly larvae
  - d. Control of fly eggs

3. Horn flies cause injury to cattle by:
  - a. Sucking blood
  - b. Digging in the ground
  - c. Buzzing around their face
  - d. Feeding on their hooves



PUSDA, Agriculture Research Service

4. Which of the following is **NOT** an advantage of using oral larvicides?
  - a. Does not cause insect resistance issues
  - b. Can be used in lactating animals with no milk withholding period
  - c. Kills existing adult flies
  - d. Kills larvae in manure
5. Which of the following is true regarding feed additives for fly control?
  - a. The additives are most effective against adult face flies
  - b. All livestock must be treated in an area of several square miles
  - c. Additives are only used in the winter
  - d. None of the above

# Livestock Pest Management - Answers

## Insect Management

**1. Correct answer: D**

Explanation: Sanitation is eliminating an environment that encourages pest reproduction to help control the pest population. For example, fly larvae thrive in a moist, dark environment. So cleaning up manure and spilled feed will reduce potential sites for the fly to lay eggs that will hatch into larvae and develop into adult flies. This applies to outdoor feeding and corral sites, as well as confined operations.

**2. Correct answer: B**

Explanation: Space sprays and aerosols are used to rapidly reduce populations of flying insect pests and vectors. The sprays must contact the flies directly. Aerosols are often used in milk rooms because they have no residues that will remain on surfaces. The space sprays or aerosols only control adult flies and have no effect on larvae.

**3. Correct answer: A**

Explanation: Unlike house flies, horn flies do not collect on barn walls, fences, feeders, etc. Horn flies are about half the size of house flies and are usually found feeding on the back, sides, or belly of cattle. Horn flies have piercing mouth parts and feed on blood of the cattle. Each fly is oriented with its head down and the adult fly will remain on that same host animal for life, except to lay eggs in manure.

**4. Correct answer: C**

Explanation: Oral larvicides are fed to livestock, pass through the animal and kill developing fly larvae in the manure. They are used for horn fly control because the female will deposit eggs exclusively in fresh cattle manure. These can be used in pasture settings as well as feeding operations. Oral larvicides have not shown fly resistance and can be used on lactating animals. However, oral larvicides will not control existing adult flies.

**5. Correct answer: B**

Explanation: Feed additives are insecticides that are passed through the animal's digestive system to destroy developing fly larvae in manure. Additives generally destroy up to 90% of the developing larvae, but there may still be flies on the animals from nearby untreated herds. Flies can easily travel several miles to find cattle.

6. This common fly pest of poultry and confined livestock facilities is found on barn walls and feeders, and has sponging mouthparts:

- a. Horn fly
- b. House fly
- c. Horse fly
- d. Stable fly



Clif Little, Ohio State University Extension

7. Sanitary methods to control house flies in a livestock or poultry facility include:

- a. Clean up spilled feed
- b. Frequently remove moist manure
- c. Remove decaying organic matter
- d. All of the above

8. An example of exclusion to control flies in the milk room is:

- a. Aerosols
- b. Screening
- c. Larvicides
- d. Backrubbers

9. An effective spray for controlling house flies in an enclosed barn would be:

- a. Residual
- b. Knockdown
- c. Aerosol
- d. Feed additive

10. Rattailed maggots:

- a. Are larvae of the syrphid fly
- b. Live in highly-polluted water
- c. Have no effective pesticide controls
- d. All of the above

**6. Correct answer: B**

Explanation: The most common fly species pest of poultry is the house fly. The house fly is also a pest in confined livestock operations. House flies are usually found on the fences, walls, and objects in the barn rather than on the animals. It doesn't feed on animals.

**7. Correct answer: D**

Explanation: House flies lay eggs in a variety of places, like silage, spilled feeds, animal bedding, manure and moist hay. Frequently cleaning and removing waste and organic material is essential for house fly control. Chemicals are only effective when used along with sanitation to reduce fly populations.

**8. Correct answer: B**

Explanation: Exclusion techniques help reduce fly access to indoor areas such as a milk room. Indoor fly control can be achieved by exclusion by using screens for windows and doors, as well as caulking around windows and doors. Exclusion needs to be done along with sanitation to control fly populations.

**9. Correct answer: A**

Explanation: Residual surface sprays are applied to walls, ceilings, posts, and other fly resting places. This is effective for house flies because they are usually found on walls, ceilings, and other parts of the barn. Care must be taken to cover waterers and feeders when making the application. Never use residual surface sprays in the milk house and do not contaminate milk and milk utensils. Knock downsprays, which includes aerosols, are effective for rapid knockdown and kill adult flies, but lack long-lasting control on surfaces for house fly control.

**10. Correct answer: D**

Explanation: Rattailed maggots are a management problem in manure lagoons resulting from improper care or construction. During warm months, the maggots will migrate from the lagoon in large numbers and can contaminate livestock feed and congregate in dark, moist areas for pupation. To prevent this, keep the lagoon filled so the waterline remains above the solids. Rattail maggots are only prevented through management; there are no effective pesticide control measures.

11. What is a cultural management strategy to help control fly breeding and populations in stored manure?
- a. Add nitrogen
  - b. Reduce moisture
  - c. Spray herbicides
  - d. None of the above

### **Bird Management**

12. What is **NOT** part of an effective bird control program?
- a. Exclusion
  - b. Chemical control
  - c. Trapping
  - d. Ultrasonic devices
13. What is the most common species of bird pests around farmsteads?
- a. Black birds, crows
  - b. Sparrows, starlings, pigeons
  - c. Hawks, owls
  - d. Geese, grackles

### **Label and Precautions**

14. Which one of the following is **NOT** the proper application for Fly Be Gone EC? (*See label in back of study guide.*)
- a. Backrubbers
  - b. Residual surface spray
  - c. Feed additive
  - d. Manure treatment
15. What precaution is on the Fly Be Gone EC label for lactating dairy cattle? (*See label in back of study guide.*)
- a. There is no precaution
  - b. It can't be used on lactating dairy cattle
  - c. Must wait 20 minutes between application and milking
  - d. Must discard all milk if using the product



**11. Correct answer: B**

Explanation: Effort should be made to keep manure as dry as possible, such as less than 30 percent moisture level. Reducing moisture helps reduce fly breeding. Spreading manure thinly on the field will also help reduce moisture. Stored manure can be covered or mixed on a regular basis to prevent water from pooling.

## **Bird Management**

**12. Correct answer: D**

Explanation: Excluding birds from shelter, roosting, and nesting sites by using netting or screening is very important. Chemical control is available, but only through USDA-APHIS. Trapping can also be used in limited areas to decrease bird populations. Ultrasonic devices have not been effective in management of nuisance bird populations.

**13. Correct answer: B**

Explanation: Sparrows, starlings, and pigeons are pests in farmsteads that can spread disease and reduce production. The birds require food, water, and shelter. Management is achieved by manipulating each factor. Protect sources of food such as grain storage and livestock feed. Eliminate any unnecessary water from the farmstead such as in ruts or junk piles. The water level in watering troughs should be kept low enough so birds cannot reach it when perched on the edge.

## **Label and Precautions**

**14. Correct answer: C**

Explanation: Fly Be Gone EC is not labeled as a feed additive. The specific use directions include backrubbers, residual surface spray, and larvicidal sprays.

**15. Correct answer: C**

Explanation: Fly Be Gone EC can be used on lactating (milking) dairy cattle. But there are precautions that are listed in the Specific Use Directions section of the label. You must wait 20 minutes between applying the product to the cow and beginning milking. The label also states that the applicator should try to avoid spraying the cows' teats unless the teats are washed with an approved cleansing solution and dried before milking. The label also states that there is no milk discard when using the product. Always read the label thoroughly for specific precautions. Label precautions are designed to ensure the health of the animals and prevent unwanted pesticide residues in meat, milk, or other food products.

16. Today is Monday. You are planning to take some non-Brahman beef cattle to the stockyards on Wednesday. Could you use some Fly Be Gone EC on the cattle? (*See label in back of study guide.*)
- No, there is a precaution on the label
  - Yes, there is no slaughter withdrawal
  - The product can't be used on cattle
  - There is not enough information on the label
17. An example of an off-label use of a pesticide would be:
- Applying less than labeled rate
  - Applying a pesticide to dairy cows that is only labeled for beef cattle
  - Application at night
  - Both a and c

**16. Correct answer: B**

Explanation: In the Specific Use Directions section of the Fly Be Gone EC label, it states that there is no withholding period from the last application to slaughter. You do not need to wait for a specified time before taking the cattle to the stockyards. The label will indicate if you need to wait for a specific number of days before the animals are slaughtered.

**17. Correct answer: B**

Explanation: Always read and follow label directions. Just because a product is labeled for one animal use does not mean it can be used on all animals. In this case, the pesticide tolerance has been established for beef cattle, not lactating dairy cows. Any off-label pesticide application is illegal. A pesticide can only be used on an animal or crop listed on the label.

## Score Card

Number of Questions Answered Correctly	Percent Correct	Evaluation
53-58	>90%	<b>Excellent:</b> You have a very good understanding of areas addressed in this student workbook.
47-52	>80%	<b>Good:</b> Be sure you understand those questions that you missed. It may help to read the study material again and re-answer the questions you missed.
41-46	>70%	<b>Needs Improvement:</b> Your score indicates a borderline level of expertise. Be sure to re-read the study material and re-answer the questions you missed.
0-40	<70%	<b>Study Needed:</b> Re-read the study material and work through sections of the workbook again.

## Additional Study Aids

Forage Crops Label - Insecticide X ..... page 38  
(to be used with questions earlier in the study guide)

Livestock Label - Fly Be Gone EC ..... page 42  
(to be used with questions earlier in the study guide)

### **Pest Color Images**

Common Forage Crop Insects ..... page 46

Common Livestock Insects ..... page 46

Common Forage Crop Weeds ..... page 47

The following is a sample label to use for the study guide.  
This label is for educational use only.

***RESTRICTED USE PESTICIDE***

**DUE TO TOXICITY TO FISH AND AQUATIC ORGANISMS**

**For retail sale to and use only by certified applicators, or persons under their direct supervision,  
and only for those uses covered by the certified applicator's certification.**

**Insecticide X**  
**Group 3 Insecticide**

**ACTIVE INGREDIENT:**

Abc-xyz ab phenol methyl: ..... 15%

OTHER INGREDIENTS: ..... 85%

TOTAL ..... 100%

**Insecticide X contains 2.08 lbs. of active ingredient per gallon and is a capsule suspension.  
Contains petroleum distillate.**

**KEEP OUT OF REACH OF CHILDREN.**  
**WARNING**

**See additional precautionary statements and directions for use in label.**

**EPA Reg. No. xxx-xxxx    EPA Est. xxxxx-OH-1**

**Net Contents: 1 gallon**

# INSECTICIDE X

## Restricted-Use Pesticide

### Group 3 Insecticide

#### Toxic to Fish, Aquatic Organisms, and Wildlife

For retail sale to, and use only by, Certified Applicators or persons under their direct supervision, and only for those users covered by the Certified Applicator's certification.

#### ACTIVE INGREDIENT:

Abc-xyz ab phenol methyl:..... 15%

OTHER INGREDIENTS:..... 85%

TOTAL..... 100%

**Insecticide X contains 2.08 lbs. of active ingredient per gallon and is a capsule suspension.**

**Contains petroleum distillate.**

EPA Reg. No. xxx-xxxx

EPA Est. xxxxx-OH-1

VIP Chemical Company

Nearby, NC 00000

Net Contents:

1 Gallon

## WARNING/ADVISO

### KEEP OUT OF REACH OF CHILDREN

#### PRECAUTIONARY STATEMENTS

##### Hazards to Humans and Domestic Animals

#### WARNING/ADVISO

May be fatal if swallowed. Causes moderate eye irritation. Harmful if absorbed through skin. Avoid contact with eyes, skin or clothing. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum or using tobacco. Remove and wash contaminated clothing before reuse.

Skin exposure may also result in a sensation described as a tingling, itching, burning, or prickly feeling. Onset may occur immediately to 4 hrs. after exposure and may last 2-30 hrs., without damage. Wash exposed areas once with soap and water. Relief from the skin sensation may be obtained by applying an oil-based cream.

#### Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for Category G on an EPA chemical resistance category selection chart.

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants.
- Chemical-resistant gloves, Category G, such as barrier laminate or Viton® ≥ 14 mils
- Shoes plus socks
- Protective eyewear

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do NOT reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

## FIRST AID

#### If Swallowed

- Call a poison control center or doctor immediately for treatment advice.
- Do not give **any** liquid to the person.
- Do not induce vomiting unless told to do so by the poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

#### If in Eyes

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

#### If on Skin or Clothing

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

#### If Inhaled

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.
- Call a poison control center or doctor for treatment advice.

#### HOT LINE NUMBER

For 24-hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire or Accident)

Call:

**1-800-XXX-XXXX**

**Have the product container or label with you when calling a poison control center or doctor, or going for treatment.**

**NOTE TO PHYSICIAN** - Contains petroleum distillate - vomiting may cause aspiration pneumonia.

## INSECTICIDE X

### User Safety Recommendations

#### Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

### Environmental Hazards

This pesticide is extremely toxic to fish and aquatic organisms and toxic to wildlife.

For terrestrial uses: do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not apply when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

### STORAGE AND DISPOSAL

#### Do not contaminate water, food or feed by storage or disposal.

**Storage:** Store in original containers only. Keep container closed when not in use. Do not store near food or feed. In case of spill or leak on floor or paved surfaces, soak up with sand, earth, or synthetic absorbent. Remove to chemical waste area. DO NOT ALLOW PRODUCT TO FREEZE.

**Pesticide Disposal:** Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

**Container Disposal:** Triple rinse (or equivalent); then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill or by other procedures allowed by State and local authorities.

**CONTAINER IS NOT SAFE FOR FOOD, FEED, OR DRINKING WATER!**

### DIRECTIONS FOR USE RESTRICTED-USE PESTICIDE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

SHAKE WELL BEFORE USING.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

This labeling must be in possession of the user at the time of application.

### AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted -entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

#### Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours.

PPE equipment required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water are:

- Coveralls
- Chemical-resistant gloves, Category F, such as barrier laminate, butyl rubber, nitrile rubber or Viton®
- Shoes plus socks

### GENERAL DIRECTIONS FOR USE

Initial and residual control are contingent upon thorough coverage. Apply with ground or air equipment using sufficient water to obtain full coverage of foliage. Apply in a minimum of 2 gals. per acre by air or 10 gals. per acre by ground unless otherwise specified in this label. When foliage is dense or pest pressure is high, use of higher application volumes and/or higher use rates may improve initial residual control.



## INSECTICIDE X

## SPECIFIC USE DIRECTIONS

AGRICULTURAL USES			
Crop	Target Pests	Rate	
		lb. a.i./A	fl. oz/A
ALFALFA AND ALFALFA GROWN FOR SEED	Alfalfa Caterpillar Army Cutworm Leafhopper species Looper species Webworm species	0.015-0.025	0.96-1.60
	Alfalfa Weevil Armyworm Bean Leaf Beetle Blister Beetle Grasshopper species Pea Aphid Stink Bug species Thrips species Western Armyworm	0.02-0.03	1.28-1.92

## Remarks

- Apply as required by scouting. Timing and frequency of applications should be based upon insect populations reaching locally determined economic thresholds.
- Apply with ground or air equipment using sufficient water to obtain full coverage of foliage. Apply in a minimum of 2 gals. per acre by air or 10 gals. per acre by ground.
- Avoid application when bees are actively foraging by applying during the early morning or during the evening hours.
- **Do not** apply more than 3.84 fl. oz. of product per acre per cutting.
- **Do not** apply more than 15.36 fl. oz. of product per acre per season.
- **Do not** apply within 1 day of harvest for forage or within 7 days of harvest for hay.

Crop	Target Pests	Rate	
		lb. a.i./A	fl. oz/A
CANOLA	Armyworm species Cabbage Seedpod Weevil Cutworm species Diamondback Moth Flea Beetle Grasshoppers Looper species Lygus Bug	0.015-0.03	0.96-1.92
	Cabbage Aphid	0.03	1.92

## Remarks

- Apply as required by scouting, usually at intervals of 5 or more days. Timing and frequency of applications should be based upon insect populations reaching locally determined economic thresholds.
- Apply with ground or air equipment using sufficient water to obtain full coverage of foliage. When applying by air, apply a minimum of 2 gals. of water per acre.
- **Do not** apply within 7 days of harvest.
- **Do not** apply more than 0.09 lb. a.i. (5.76 fl. oz. or 0.36 pints of product) per acre per year.

The following is a sample label to use for the study guide.  
This label is for educational use only.

***RESTRICTED USE PESTICIDE***

For retail sale to and use only by certified applicators, or persons under their direct supervision,  
and only for those uses covered by the certified applicator's certification.

**Fly Be Gone EC**

**Livestock, poultry and premise insecticide spray**

**ACTIVE INGREDIENT:**

Tetrachlorvinphos (CAS # xxxxx-xx-x): .....23.0%

Related Compounds: .....0.4%

OTHER INGREDIENTS: .....76.6%

TOTAL .....100.0%

**KEEP OUT OF REACH OF CHILDREN.**

**CAUTION**

See additional precautionary statements and directions for use in label.

EPA Reg. No. xxx-xxxx    EPA Est. xxxxx-OH-1

Net Weight: 4 pounds/1.8 kilograms

## FLY BE GONE EC

Livestock, poultry and premise insecticide spray

### ACTIVE INGREDIENTS:

Tetrachlorvinphos (CAS # xxxxx-xx-x): ..... 23.0%

Related Compounds:..... 0.4%

OTHER INGREDIENTS:..... 76.6%

TOTAL..... 100.0%

EPA Registration No. xxxxx-xx

VIP Chemical Company

Nearby, TX 00000

Net Weight:

4 pounds/1.8 Kilograms

## CAUTION

KEEP OUT OF REACH OF CHILDREN

### PRECAUTIONARY STATEMENTS

#### Hazards to Human and Domestic Animals

#### CAUTION

Harmful if inhaled, swallowed or absorbed through skin. Causes moderate eye irritation. Avoid contact with eyes, skin, or clothing. Avoid breathing spray mist and dust. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals. Wash thoroughly with soap and water after handling.

### Personal Protective Equipment (PPE)

Applicators and handlers must wear:

1. Long-sleeved shirt and long pants
2. Chemical-resistant gloves
3. Shoes and socks

### USER SAFETY REQUIREMENTS

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

### USER SAFETY RECOMMENDATIONS

- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

### Statement of Practical Treatment

#### If Swallowed

- Call a poison control center or doctor immediately for treatment advice.
- Have a person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

#### If Inhaled

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible.
- Call a poison control center or doctor for further treatment advice.

#### If in Eyes

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes.
- Call a poison control center or doctor for treatment advice.

#### If on Skin or Clothing

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center for treatment advice.

### HOT LINE NUMBER

Contains an organophosphate that inhibits cholinesterase.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

**For emergency medical treatment information**

**Call:**

**1-800-XXX-XXXX**

**NOTE TO PHYSICIAN** - This product is a cholinesterase inhibitor. If symptoms of cholinesterase inhibition are present, atropine sulfate by injection is antidotal. 2-PAM is also antidotal and may be administered, but only in conjunction with atropine. Product may cause aspiration pneumonia. Probable mucosal damage may contraindicate the use of gastric lavage.

## FLY BE GONE EC

### Physical or Chemical Hazards

Combustible. Do not use, pour, spill or store near heat or open flame. Do not use with thermal foggers or heat-generating devices.

### Environmental Hazards

This product is toxic to fish, birds, and other wildlife. Drift and runoff may be hazardous to aquatic organisms in adjacent areas. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water.

### DIRECTIONS FOR USE

#### Read the entire label prior to use.

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. For Agricultural/ Commercial Use Only. This product is suitable for use in conventional power or low pressure knapsack sprayers and in livestock backrubbers. Follow the Use Directions for the proper dilution needed for specific insect control.

#### Application Restrictions

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. Do not enter or allow others to enter the treated areas until sprays have dried. Must be diluted with water except for backrubber use.

### STORAGE AND DISPOSAL

**Do not contaminate water, food or feed by storage or disposal.**

**Pesticide Storage:** Store in original container only. Store at temperatures above 32° F.

**Combustible. Do not use, pour, spill or store near heat or open flame. Do not store diluted product.**

**Pesticide Disposal** - Pesticide wastes are acutely toxic. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State pesticide or environmental control agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

**Container Disposal** - Triple rinse (or equivalent). Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or by other approved State and local procedures.

### SPECIFIC USE DIRECTIONS

**Livestock Use Directions:** Do not make direct application to livestock more frequently than once per day.

Use	Insect	Dilution in Water	Remarks
Livestock Spray (Beef Cattle)	Horn Flies, Lice, including Tail Lice, and aids in control of Face Flies	1 gal. in 75 gal. or 5 oz. in 3 gal.	Dilute in water as indicated and spray directly on the animal only to the point of runoff. Use between 1/2 to 1 gallon of diluted spray solution per animal depending on size and hair coat. Do not treat more often than every 10 days. Do not apply to calves under six months of age. Brahman and Brahman-cross cattle should not be treated as they may show hypersensitivity to organophosphate pesticides. Do not apply in combination with other dermal organophosphate pesticides (e.g. trichlorfon). There is no withholding period from last application to slaughter.
	Horn Flies, Lone Star Ticks	1 gal. in 200 gal. or 2 oz. in 3 gal.	Apply as above. For severe tick infestations, dilution may be increased to 1 gallon in 50 gallons of water.
Livestock Spray (Lactating Dairy Cattle)	Horn Flies, Lice, Lone Star Ticks, and aids in control of Face Flies	1 gal. in 200 gal. or 2 oz. in 3 gal.	Dilute in water as indicated. Direct spray to cover thoroughly with up to 1/2 gallon of the dilution per animal. Repeat as necessary. Do not apply to calves under six months of age. No milk discard is required. Care should be taken that the spray does not come in direct contact with the lactating dairy cow's teats unless they are washed with an approved cleansing solution and dried before milking. Apply the spray at least 20 minutes prior to milking or after milking has been completed.

(SAMPLE LABEL - FOR EDUCATIONAL USE ONLY)

## FLY BE GONE EC

### SPECIFIC USE DIRECTIONS (CONTINUED)

#### Backrubber Use Directions

Use	Insect	Dilution in Oil	Remarks
Backrubber or Facerubber (Beef and Dairy Cattle)	Horn Flies, and aids in control of Face Flies	1 gal. in 25 gal. or 5 oz. in 1 gal.	Mix with any approved backrubber base oil. Pour diluted solution into oil reservoir of mechanical rubbing devices or pour one gallon per 20 linear feet on burlap or rope backrubbers. Keep backrubber or facerubber charged.

#### Poultry Use Directions

Use	Insect	Dilution in Water	Remarks
Caged Chickens	Lice & Mites	1 gal. in 50 gal. or 5 oz. in 2 gal.	Apply 1 gal. of dilution/100 birds under high pressure (no less than 100-125 psi) to the vent and fluff areas from below. Repeat when necessary; however, not more often than every 14 days. For individual bird treatment, apply one ounce of dilution per bird.
Chickens on Litter	Lice & Mites	1 gal. in 50 gal. or 5 oz. in 2 gal.	Apply 1-2 gal. of dilution/1000 sq. ft. evenly with penetration of litter surface. Also apply thoroughly to walls, roosts, cracks and crevices. Spray birds as above. Treat roosters carefully to avoid reinfestation of breeding flocks.
Roost Paint	Lice & Mites	1 gal. in 25 gal. or 5 oz. in 1 gal.	Apply 1 pt. of dilution/100 ft. of roost area with brush or spray.
Poultry Buildings	Fowl Tick (Blue Bug)	1 gal. in 25 gal. or 5 oz. in 1 gal.	Apply 1 gal. of dilution/100-150 sq. ft. to thoroughly cover walls, ceilings, floors, cracks and crevices using high pressure spray.

#### Premise Use Directions for Poultry and Livestock Facilities

Use	Insect	Dilution in Oil	Remarks
Residual Surface Spray	Flies, Gnats, Litter Beetles, Mosquitoes, Spiders, Wasps	1 gal. in 25 gal. or 5 oz. in 1 gal.	Apply 1 gal. of dilution/500-1000 sq. ft. Thoroughly cover walls, ceilings and other areas where pests rest or congregate in dairy barns, horse barns, poultry houses, swine buildings, livestock sheds and other farm buildings. Extreme infestations may necessitate increasing the diluted spray to one gal. per 12-1/2 gal. or 10 oz. per 1 gal. of water
Larvicide	Maggots (fly larvae)	1 gal. in 25 gal. or 5 oz. in 1 gal.	Apply 1 gal. of dilution/100 sq. ft. of droppings as a coarse spray. Repeat at 7-10 day intervals until droppings begin to cone up, then treat only "hot spots" (small areas found to have a large number of maggots). Do not spray manure where runoff to soil or water can occur. Do not spray animals directly with this concentration.



## Common Forage Crop Insects



Dr. Ron Hammond, The Ohio State University

Potato leafhopper



Dr. Ron Hammond, The Ohio State University

PLH causes yellow leaf tips on alfalfa



Dr. Ron Hammond, The Ohio State University

Alfalfa weevil



Dr. Ron Hammond, The Ohio State University

Alfalfa weevil chewing damage to alfalfa

## Common Livestock Insects



USDA, Agriculture Research Service

Horn fly (found on the animal)



Cliff Little, Ohio State University Extension

House fly (found on buildings, walls, & surfaces)

## Common Forage Crop Weeds



### **Canada Thistle**

Broadleaf, Perennial

(Aggressive, creeping weed that reproduces from underground rhizomes)



### **Chickweed**

Broadleaf, Winter Annual

(Grows as a large mat of foliage)



### **Curly Dock**

Broadleaf, Perennial

(Can lower quality of forage)



### **Dandelion**

Broadleaf, Perennial

(Has long taproot)



### **Quackgrass**

Grassy Perennial

(Reproduces from underground rhizomes)



### **Multiflora Rose**

Woody Perennial

(Commonly found in pastures)