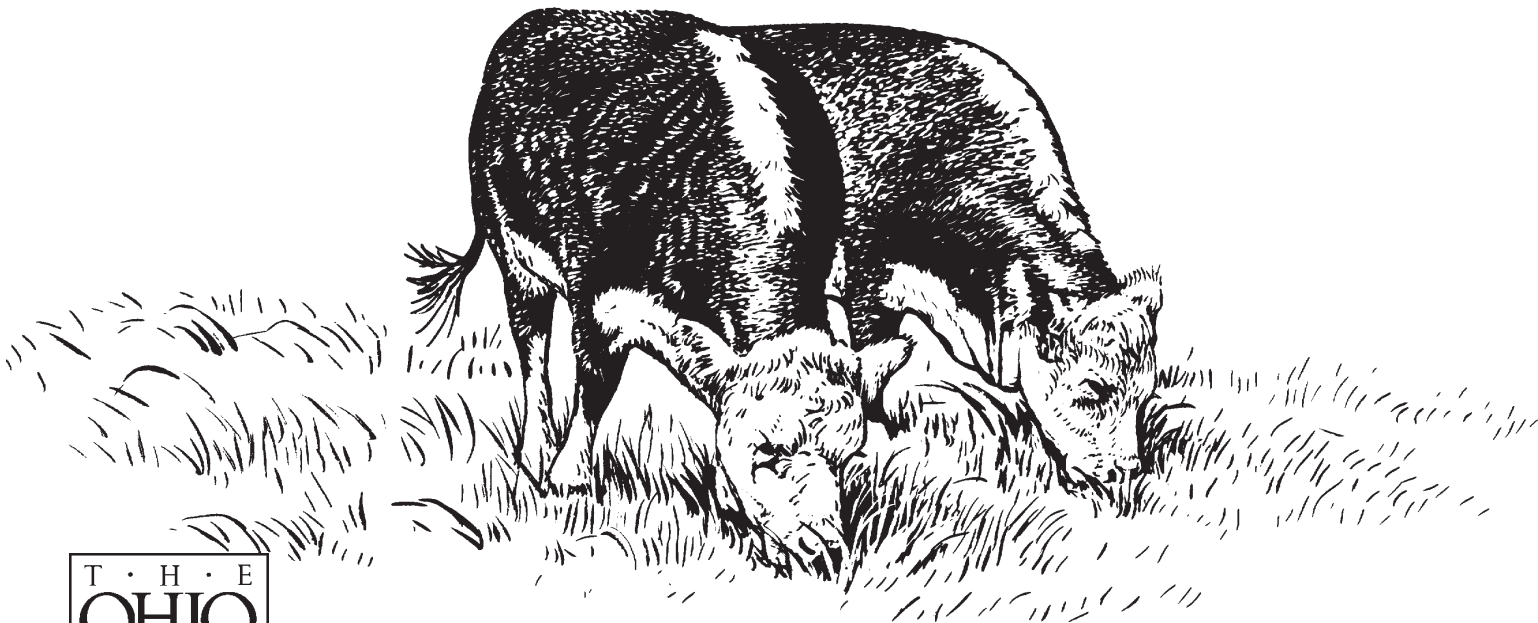


# Ohio Pesticide Applicator Training

*Forage Crops*

**Student Workbook**





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## Preface

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 exams required for certification in the forage category. The sample questions presented in this manual will help the reader obtain a general understanding of forage pest problems, approaches to control, and general information needed to apply and use pesticides safely.

## How to Use This Workbook

This workbook is designed to serve as a supplementary study guide to the following bulletins published by the Ohio State University Extension. These and other publications are available through local county Extension offices.

Comments and suggestions to improve this study tool for future users are appreciated. Direct correspondence to Pesticide Applicator Training, 249 Howlett Hall, 2001 Fyffe Ct., Columbus, OH 43210.

Bulletin 789 *Weed Control Guide for Ohio Field Crops*

Bulletin 472 *Ohio Agronomy Guide*

Bulletin 545 *Insect Pests of Field Crops*

Bulletin 631 *Field Crop Disease Management*

Bulletin 825 *Applying Pesticides Correctly*

Users should read the recommended bulletins for each section before attempting to answer questions in the workbook. When using this workbook, use the flap on the back cover to conceal the answers while answering the questions on the left-hand page. Once all the questions for a section are answered, check to see if the responses are correct, mark those incorrect, and read the explanation for each question. If the explanation is confusing or if you disagree with the answer or explanation, refer to the section indicated in the reference.

**TDD# 1 (800) 589-8292 (Ohio only)  
or (614) 292-1868**

**Weed Control**

# **Ohio Pesticide Applicator Training**

**Forage Crops**

# Forage Weed Control

*Author: Jim Skeeles, County Extension Agent, Agriculture*

1. During the restricted entry period (REI), a handler may enter a treated field:
  - A. Any time after a pesticide has been used
  - B. If he/she is trained and wearing protective equipment
  - C. When the smell is gone
  - D. When wearing normal clothing
  - E. After 48 hours
2. Which of the following are cultural weed control practices?
  - A. Fertilization
  - B. Liming
  - C. Cutting height
  - D. Spacing of harvests
  - E. All of the above
  - F. None of the above
3. Which of the following can influence weed infestations in pastures?
  - A. Clipping
  - B. Rotational grazing
  - C. Herbicide application
  - D. A & B
  - E. A & C
  - F. All of the above
4. Which of the following types of weed control is more important in controlling weeds in forage crops?
  - A. Cultural control
  - B. Herbicide control
5. Banvel and 2,4-D are labeled as a selective control of perennial broadleaf weeds in permanent grass pastures.
  - A. True
  - B. False
6. The following chemical(s) give the best weed control when weeds are actively growing:
  - A. 2,4-D
  - B. Banvel
  - C. 2,4-D + Banvel
  - D. Roundup
  - E. All of the above
  - F. None of the above
7. Foliar herbicides for multiflora rose control are most effective when applied in late spring or early summer after full leaf-out.
  - A. True
  - B. False
8. Management of perennial weeds in forage crops requires the use of foliar-applied herbicides
  - A. True
  - B. False

1. **Correct Answer: B**, Bulletin 843, How to Comply  
Explanation: Agricultural pesticides used in this production of plants under the Worker Protection Standard will have a restricted entry interval (REI). In general, under WPS, workers must be kept out of a treated area during the REI. Only appropriately trained and equipped pesticide handlers and early entry workers may enter a treated area during an REI to perform certain tasks.
  
2. **Correct Answer: E**, Bulletin 472, Forage Production chapter, "Weed Management in Forages"  
Explanation: The most important factor in forage weed control is having a good forage stand. All of the factors listed have an effect on stand, and, thus, have an effect on weed control.
  
3. **Correct Answer: F**, Bulletin 472, "Pasture Management" chapter, "Improving Productivity"  
Explanation: All of the answers (A, B, and C) influence weed infestations in pastures. The response "D" is correct, as is the response "E"; however, the response "F" is most correct.
  
4. **Correct Answer: A**  
Explanation: Herbicide application on forage crops (pastures and hay) is relatively infrequent, especially when compared to grain and cereal crops. Forage producers depend on cultural practices to allow the forage to "out compete" the weeds, generally obtaining adequate control.
  
5. **Correct Answer A**, Bulletin 789, "Grass Pastures" chapter  
Explanation: Banvel and 2,4-D are selective herbicides because they control only broadleaves, not grasses. They control annual broadleaf plants that come from seeds each year and perennial broadleaf plants that live multiple years. Roundup is a nonselective herbicide that kills everything it contacts.
  
6. **Correct Answer: E**  
Explanation: Active plant growth is important for weed control with all postemergence herbicides, especially the hormone-like herbicides such as 2,4-D, Banvel and Butyrac (2,4-DB). Roundup effectiveness also depends on good growing conditions, especially when applied in the spring.
  
7. **Correct Answer: A**
  
8. **Correct Answer: B**  
Explanation: Woody shrubs and trees, such as multiflora rose and osage orange, can be controlled by herbicide application or a combination of mowing or hand-cutting plus herbicides. Mowing alone will control some species. Again, good cultural practices will keep pasture in good condition and competitive with weeds.

9. Choose from the following list of forage herbicides to fill in the blanks:

Balan	Butyrac 200	Buctril
Eptam	Sinbar	Velpar
Roundup	Sencor/Lexone	Poast Plus
Kerb	Gramoxone Extra (previously called Paraquat)	No herbicide

- a. You are going to seed alfalfa in the spring. Which two of the above materials can be incorporated into the seedbed (prior to planting) to keep weeds from germinating?

\_\_\_\_\_ and \_\_\_\_\_

- b. If you included grass in the seeding mixture, which if any of the materials used to answer question "a" can be used without injury to grass?

\_\_\_\_\_

- c. If you seeded alfalfa with oats, which if any of the materials used to answer question "a" can be used without injury to the oats?

\_\_\_\_\_

- d. As the spring seeded alfalfa germinates, so do broadleaf weeds. Which two materials can be used after emergence of weeds and alfalfa to control small broadleaf weeds?

\_\_\_\_\_ and \_\_\_\_\_

- e. If the alfalfa will be harvested 45 days after spraying the herbicide, which of the materials used to answer the above question should not be used?

\_\_\_\_\_

- f. Suppose the weeds breaking through your spring seeded alfalfa were grasses. You seeded only alfalfa. You wish to control the grasses before taking off the first cutting of hay. What material can be used?

\_\_\_\_\_

- g. Which of the herbicides listed above can be used on your newly seeded alfalfa as soon as dormancy occurs in the fall? This material controls grasses, chickweed, and henbit.

\_\_\_\_\_

- 9a. **Correct Answers: Balan and Eptam**, Bulletin 789, Forages Chapter, "Establishment & Seedling Year"  
Explanation: Balan and Eptam are the two materials approved for preemergent application to alfalfa. Both materials can be applied only to conventionally seeded alfalfa because they must be incorporated immediately into a prepared seedbed. They cannot be used if grass is seeded with alfalfa because the grass will be killed.
- b. **Correct Answer: No Herbicide**, Bulletin 789, Forages Chapter  
Explanation: Neither material should be used if alfalfa is seeded with a grass. Both Balan and Eptam prevent grasses from germinating. Currently, there is no preemergent herbicide for mixed grass-legume seedings.
- c. **Correct Answer: No Herbicide**, Bulletin 789, Forages Chapter  
Explanation: Just as Balan and Eptam prevent grasses from germinating, they also prevent small grain, also in the grass family, from germinating. There is no preemergent herbicide for seedings with small grains, just as there is none for seedings with grasses.
- d. **Correct Answers: Butyrac 200 (2,4-DB) and Buctril**, Bulletin 789, Forages Chapter  
Explanation: Materials that can be sprayed over the top of newly seeded, standing alfalfa include Butyrac, Buctril, Kerb, and Poast. Application is needed in the spring, so Kerb is not a possibility. Because broad-leaf weeds need to be controlled, Poast is eliminated, leaving Butyrac and Buctril. Pursuit could also be used.
- e. **Correct Answer: Butyrac 200**, Bulletin 789, Forages Chapter  
Explanation: Butyrac 200 restricts harvest for 60 days following treatment, while Buctril restricts harvest for only 30 days following treatment. Because harvest is expected 45 days after application, Buctril is the herbicide of choice.
- f. **Correct Answer: Poast Plus**, Bulletin 789, Forages Chapter  
Explanation: Poast Plus is very effective against grasses, especially annual grasses, and is the only grass control material that can be sprayed over newly seeded, standing alfalfa during the spring. Kerb offers good grass control, but can only be applied in the fall.
- g. **Correct Answer: Kerb**, Bulletin 789, Forages Chapter  
Explanation: Kerb is the only material that can be applied to newly seeded alfalfa during the first fall. Kerb is very effective against the weeds mentioned. Other materials such as Sencor/Lexone, Sinbar, or Velpar can be applied to establish alfalfa during dormancy.



10. Choose from the following list of forage herbicide(s) to fill in the blanks for a-f. Assume the alfalfa seeding is now an established stand for all questions on this page.

- |   |         |
|---|---------|
| Butyrac 200 (2,4-DB)                            | Kerb    |
| Poast   | Roundup |
| Sencor/Lexone                                   | Sinbar  |
| Treflan   | Velpar  |
| Gramoxone Extra<br>(previously called Paraquat) |         |

- a. Name two of the above materials which can be applied to only established and dormant stands of alfalfa?  
\_\_\_\_\_ and \_\_\_\_\_
- b. Which of the above materials can be applied to established stands of alfalfa while dormant, or any-time before new growth exceeds 2 inches in height?  
\_\_\_\_\_
- c. Which of the above materials can be applied to dormant alfalfa, and if applied to nondormant alfalfa must be applied immediately after cutting?  
\_\_\_\_\_
- d. Which of the above materials needs to be applied to established stands of alfalfa during the spring, before annual grasses have emerged, but needs a half inch of rainfall or irrigation within 3 days of application to be effective?  
\_\_\_\_\_
- e. Which of the above materials have planting restrictions for two years after application?  
\_\_\_\_\_ and \_\_\_\_\_
- f. In the established alfalfa, grass has become established. What herbicide applied during the dormant season will most injure the grass?  
\_\_\_\_\_

11. What herbicide is used to control multiflora rose as a spot concentrate application, while the multi-flora rose is dormant?  
\_\_\_\_\_

10. The herbicides listed are those labeled for established alfalfa stands.

- a. **Correct Answers: Sencor/Lexone and Sinbar**, Bulletin 789, Forages Chapter  
Explanation: These materials may be applied to dormant stands in the fall or spring and have a very similar spectrum of control. Sencor/Lexone, also labeled for mixed grass-legume stands, has less stringent future crop restrictions than Sinbar.
- b. **Correct Answer: Velpar**, Bulletin 789, Forages Chapter  
Explanation: Velpar can be applied during dormancy and any time growth of the alfalfa is less than 2 inches. It has a control spectrum similar to Sencor/Lexone and Sinbar and stringent future crop restrictions similar to Sinbar.
- c. **Correct Answer: Gramoxone Extra**, Bulletin 789, Forages Chapter  
Explanation: Gramoxone Extra is a chemical mowing agent. It needs to contact green growing weeds (not green alfalfa). Application to stubble no longer than 5 days after mowing will burn off weeds not mowed with the alfalfa. The material has high oral and dermal toxicity.
- d. **Correct Answer: Treflan**, Bulletin 789, Forages Chapter  
Explanation: Treflan is mechanically incorporated as a soybean herbicide. When applied to established alfalfa, it cannot be mechanically incorporated and, therefore, is practical only on irrigated alfalfa. Even then, it does not control emerged weeds.
- e. **Correct Answers: Sinbar and Velpar**, Bulletin 789, Forages Chapter  
Explanation: For both of these materials, no crop should be planted within two years of application. However, with deep tillage, corn can be planted 12 months after Velpar application.
- f. **Correct Answer: Kerb**, Bulletin 789, Forages Chapter  
Explanation: Velpar, Sinbar, and Sencor/Lexone may be applied as dormant treatments. However, Kerb may be applied while the alfalfa is dormant but before the ground freezes. Kerb will definitely injure the grass, so is only labeled for pure legume stands.

11. **Correct Answer: Banvel**  
Explanation: Banvel will effectively control multiflora rose through several methods of application. It may be applied as a spot concentrate to the soil near the stem and is effective anytime the multiflora rose is dormant (Nov.- April). Banvel may also be applied as a low oil basal bark dormant application or to the foliage when the multiflora rose is not dormant. The least effective mode of application is foliar application.

12. Which of the following can be broadcast over the top of permanent grass pasture and will control only broadleaf weeds?
- A. 2,4-D
  - B. Atrazine
  - C. Princep
  - D. Paraquat
  - E. Roundup

13. Choose from the following list of forage herbicides to fill in the blanks:

Buctril	Butyrac 200 (2,4-DB)	Velpar
Kerb	Poast	Roundup
Sencor/Lexone		

- a. Which material has a 120-day waiting period between application and when grazing or harvest is allowed?  
\_\_\_\_\_
- b. Name one material that has a one-month waiting period between application and grazing or harvesting.  
\_\_\_\_\_
- c. Which materials have less than a one-month waiting period between application and when grazing or harvesting is allowed?  
\_\_\_\_\_ and \_\_\_\_\_

14. Indicate in the *first* column if each weed is an annual (A), biennial (B), or perennial (P). In the *second* column, indicate if each weed is a grass (G), broadleaf (B), or sedge (S) by placing the appropriate letter in each blank. Note: All are problem weeds in forage corps.

A = annual	G = grass
B = biennial	B = broadleaf
P = perennial	S = sedge

Quackgrass	_____	_____
Fall panicum	_____	_____
Foxtails	_____	_____
Yellow nutsedge	_____	_____
Canada thistle	_____	_____
Curly dock	_____	_____
Mustard	_____	_____
Henbit	_____	_____
Ragweeds	_____	_____
Chickweed	_____	_____

12. **Correct Answer: A**, Bulletin 472; Bulletin 789, Grass Pastures Chapter

Explanation: Atrazine, Princep, Paraquat (Gramoxone Extra), and Roundup would kill broadleaf weeds and grass in the pasture. Banvel and 2,4-D are selective controls that do not kill grasses, but do kill broadleaf plants. Due to the volatility and their wide spectrum, drift of Banvel and 2,4-D is a hazard to broadleaf plants in lawns and gardens.

13. Any pesticide, whether an insecticide, fungicide, or herbicide, has on its label the required time between application and harvest. For the herbicides listed in question 12, the required times between application and harvest are stated in Bulletin 789, Forages Chapter. But always check the label of the product you are using. The label is the law.

a. **Correct Answer: Kerb**

Explanation: Kerb has a 120-day waiting period between application and harvesting or grazing.

b. **Correct Answers: Buctril, Sencor/Lexone, and Velpar**

Explanation: The waiting period for Sencor/Lexone is 28 days, and Buctril and Velpar both have a 30-day waiting period between application and harvest. Butyrac has a 30-day waiting period when applied to established stands, but a 60-day waiting period when applied the year of forage establishment.

c. **Correct Answers: Poast and Roundup**

Explanation: The waiting period for Poast is only 7 days, unless the forage is harvested as dry hay, where a 20-day waiting period is required. One cannot graze or harvest forage treated with Roundup for 14 days after application.

14. Curly dock and mustard are often mistaken to be biennials. Curly dock is actually a perennial, as the root lives over winter and a new root sprouts from that root the following spring. Mustard is actually a winter annual, as it germinates in the fall and forms a rosette, then grows tall with yellow flowers in the spring. Canada thistle is a perennial broadleaf, which reproduces by both seeds and creeping roots. Quackgrass is the only grass listed that is a perennial, with fall panicum and foxtails both being annuals. Yellow nutsedge is not a grass, but a sedge with a triangular stem and is a perennial. Henbit, all ragweed and chickweed are annual broadleaf weeds.

Quackgrass	<u>          P          </u>	<u>          G          </u>
Fall panicum	<u>          A          </u>	<u>          G          </u>
Foxtails	<u>          A          </u>	<u>          G          </u>
Yellow nutsedge	<u>          P          </u>	<u>          S          </u>
Canada thistle	<u>          P          </u>	<u>          B          </u>
Curly dock	<u>          P          </u>	<u>          B          </u>
Mustard	<u>          A          </u>	<u>          B          </u>
Henbit	<u>          A          </u>	<u>          B          </u>
Ragweeds	<u>          A          </u>	<u>          B          </u>
Chicweed	<u>          A          </u>	<u>          B          </u>

# Forage-Crop Weed Control

## Score Card

No. of Questions Answered Correctly	% Correct	Evaluation
14	> 90%	<b>Excellent</b> — You have a very good understanding of forage-crop weeds and their control. Proceed to the next unit.
12-13	> 80%	<b>Good</b> — Be sure you understand those questions you missed. It may help to read the “Weed Control Principles” section of the <i>Weed Control Guide for Ohio Field Crops</i> . Also, re-answer the questions you missed.
11	> 70%	<b>Needs Improvement</b> — Your score indicates a borderline level of expertise. Be sure to re-read the “Weed Control Principles” section of the <i>Weed Control Guide for Ohio Field Crops</i> . Also, re-answer the questions you missed, and read the explanations.
0-10	< 70%	Re-read the “Weed Control Principles” section of the <i>Weed Control Guide for Ohio Field Crops</i> and work through the previous section of the workbook again.

**Insect Control**

# **Ohio Pesticide Applicator Training**

**Forage Crops**

## Forage-Crop Insect Control

*Author: Troy Putnam, County Extension Agent, Agriculture*

1. Which insect is the most serious threat to the production of alfalfa in Ohio?
  - A. Alfalfa weevil
  - B. Potato leafhopper
  - C. Aphids
  - D. Meadow spittlebug
  
2. Many pesticides are hazardous to honeybees. When should pesticide applications be made so honey bees are less affected?
  - A. Around 12 noon
  - B. It makes no difference if you scout the field for honey-bee activity first
  - C. No later than 2 1/2 hours after sunrise, or earlier than 2 hours before sunset.
  - D. Between 10 a.m. and 4 p.m.
  
3. When alfalfa weevil becomes a problem, it is usually the adult that does the most feeding damage.
  - A. True
  - B. False
  
4. Populations of the alfalfa weevil generally are kept below economic levels by:
  - A. Predators and parasites
  - B. Disease
  - C. Rain and heat
  - D. All of the above
  
5. What is the preferred method of assessing damage potential from populations of the potato leafhopper?
  - A. Visual field checks
  - B. Monitoring weather fronts
  - C. Watching the number of hoppers around the light on your porch
  - D. Using a sweep net
  
6. Understanding the life cycle of insects is important. What is complete metamorphosis?
  - A. When an insect passes through 4 distinct growing stages: the egg, larva, pupa, and adult
  - B. When an insect is completely grown after emergence from the overwintering stage
  - C. When an insect hatches from the egg and resembles small versions of adults
  - D. The life cycle of all insects feeding on alfalfa

1. **Correct Answer: B**, Bulletin 545  
Explanation: Of the insects that feed on alfalfa, the potato leafhopper is the most serious threat, although during a severe infestation the weevil can cause harsh early-season injury.
  
2. **Correct Answer: C**, Bulletin 545  
Explanation: Honeybees are least active late in the evening or early in the morning. Growers should attempt to spray pesticides at that time.
  
3. **Correct Answer: B**, Bulletin 545  
Explanation: The adult of the alfalfa weevil rarely feeds to the point of economic damage. In the spring, the larval growth stage of the weevil causes the most damage to alfalfa.
  
4. **Correct Answer: D**, Bulletin 545  
Explanation: Disease, rain, and heat can all cause a reduction in the numbers of the alfalfa weevil feeding on a crop. Parasitic wasps (predators) attack the larval and adult stages of the weevil. Because the alfalfa weevil is naturally controlled most of the time by beneficial parasitic wasps that are susceptible to chemical sprays, it is important that treatments not be applied unless absolutely necessary.
  
5. **Correct Answer: D**, Bulletin 545  
Explanation: Although visual field checks can prove leafhoppers are present, it is often too late for rescue treatment if “hopperburn” (wedge-shaped yellowing of the leaf tips) is present. The leafhopper is carried into the area by weather fronts, but monitoring those fronts is an unreliable method for predicting economic damage. Using a sweep net to sample the field is the correct and most reliable method for assessing action thresholds.
  
6. **Correct Answer: A**  
Explanation: It is very important to understand the life cycles of the insects feeding on forage crops. Complete metamorphosis causes the insect to progress from the egg, to the larva, to the pupal stage, to the adult. When managing the alfalfa weevil for example, the larval stage does the most damage. If pesticides are applied before, or after this growth stage, we have probably done more damage than good. Simple metamorphosis, when the insect hatches from the egg and resembles small versions of adults, applies to the potato leafhopper. The small versions (nymphs) pass through instars as they transform into adults. (omitting the pupal stage) Correct management of pests is dependent on insect growth stage and economic thresholds.



7. Potato leafhopper feeding damage is often characterized by yellow, wedge-shaped areas on the leaf tips.
- A. True
  - B. False
8. Aphids are normally controlled by:
- A. Pesticides
  - B. Groundhogs
  - C. Parasites and predators
  - D. Field traffic
9. Preharvest limitation (or preharvest interval) is:
- A. The amount of time before you can physically enter a field to re-scout after spraying pesticides
  - B. A waiting period (in days) before harvest or grazing
  - C. Determining the amount of acres ready for cutting prior to harvest
  - D. The inability to find good help
10. Meadow spittlebug is a problem late in the year when the weather turns cooler.
- A. True
  - B. False
11. In some situations, cutting alfalfa is a better alternative than using pesticides for insect control.
- A. True
  - B. False

Match the insect damage symptom with the correct insect. Place the letter of the most correct insect on the line next to the plant symptom.

<b>Symptom</b>	<b>Insect</b>
_____ 12. Leaf injury primarily confined to the growing tips.	A. Alfalfa Blotch Leafminer
_____ 13. Frothy masses on the alfalfa plant.	B. Aphids
_____ 14. Wedge-shaped yellowing of leaf tips.	C. Alfalfa Weevil
_____ 15. Small pinholes in leaflets. Mined leaflets.	D. Meadow Spittlebug
_____ 16. Wilting plants when population is high.	E. Potato Leafhopper

**7. Correct Answer: A**

Explanation: Potato leafhopper feeding causes a yellow, wedge-shaped pattern to appear on leaf tips that can progress to a point where the plants appear "burnt" or stunted and chlorotic (yellow). This is not to be confused with boron deficiency. A boron deficient plant will develop "yellow top." The top leaves are yellow, reddish and bunched and the growing tip may actually die, while the lower leaves and branches remain green.

**8. Correct Answer: C, Bulletin 545**

Explanation: Aphids are generally controlled by parasites and predators in the field. Occasionally, populations will reach damaging levels. Rescue treatment may be needed if early cutting is not possible and more than one-half cup of aphids is collected in 10 sweeps with a net.

**9. Correct Answer: B, Bulletin 545**

Explanation: Many pesticides have a waiting period, in days, that is required before you can harvest or graze a crop. A limitation is established to avoid any residue problems. Check the label prior to application. A reentry interval (or restricted entry interval) is the time after you apply a pesticide during which people may not enter the field without personal protective equipment.

**10. Correct Answer: B, Bulletin 545**

Explanation: As weather conditions become warm in the spring, eggs that were laid in the fall hatch into nymphs. Those nymphs proceed to locate a suitable host and generate the characteristic spittle mass. Nymph activities lasts through most of the first cutting and part of the second. In general, spittlebug activity may be considered a pest of secondary importance.

**11. Correct Answer: A, Bulletin 545**

Explanation: In most cases, alfalfa taller than 22 inches should be cut rather than sprayed. When dealing with potato leafhopper, cutting should take place when the crop has reached 22 inches or hopperburn has occurred, regardless of the height. Monitor stubble regrowth for continuing insect populations. Regrowth after first cutting may be stunted by potato leafhopper.

**12. Correct Answer: C, Bulletin 545**

Alfalfa weevil - larvae are slate-colored when small, and bright green when full grown at  $\frac{3}{8}$  "

**13. Correct Answer: D, Bulletin 545**

Meadow spittlebug - soft orange or green bug found in white spittle masses on the plant

**14. Correct Answer: E, Bulletin 545**

Potato leafhopper - small  $\frac{1}{8}$  " green, wedge-shaped insect

**15. Correct Answer: A, Bulletin 545**

Alfalfa blotch leafminer - the adult, which is responsible for the pinhole feeding, is a small dull-black hump backed fly. Larvae, which create the mines (or feeding on the leaf tissue between upper and lower leaf surfaces) are minute in size.

**16. Correct Answer: B, Bulletin 545**

Aphids - green pea aphids or the spotted alfalfa aphids, which are yellow and faintly dark spotted, congregate on stems and leaves.

17. Unnecessary insecticide treatments for potato leafhoppers may result when:
- A. Treatments are made on an as-needed basis
  - B. Preventative treatments are made on a scheduled basis
  - C. Insecticides are rarely applied
  - D. None of the above
18. Growers choosing not to use insecticide treatments to prevent losses due to potato leafhopper may minimize impact by:
- A. Timely harvest
  - B. Maintaining vigorous stands
  - C. Growing alfalfa mixed with grasses
  - D. All of the above
19. IPM will automatically reduce pest problems and the use of pesticides on alfalfa.
- A. True
  - B. False
20. The economic threshold for application of insecticides is the point where:
- A. The cost of treatment is offset by maintaining or increased yield and quality
  - B. Treatment costs are more than realized yield
  - C. A farmer meets his or her budget for the year
  - D. Insects have eaten at least 25 percent of the potential profit
21. To minimize potato leafhopper impact on new alfalfa seedings, a grower should:
- A. Apply a granular insecticide before planting
  - B. Plant spring seedings as early as possible
  - C. Wait until the ground is dry
  - D. Spray the ground before seedling emergence
22. What type of pest management practices are available to Ohio alfalfa producers?
- A. Chemical
  - B. Cultural
  - C. Biological
  - D. Variety resistance or tolerance
  - E. All of the above
23. If, after cutting your alfalfa, you are considering a stubble application of insecticide for the control of potato leafhopper you should:
- A. Spray immediately after cutting
  - B. Allow 4-8" of regrowth and conduct a sweep net survey to determine if leafhoppers are at threshold
  - C. Wait until yellow leaf-tips are visible
  - D. Never apply an insecticide to alfalfa regrowth

**17. Correct Answer: B**

Explanation: Although preventative sprays can be effective in the right situation, scouting the pest population beforehand improves the efficacy of treatments.

**18. Correct Answer: D**

Explanation: Timely harvest often prevents buildup of potato leafhopper populations. Vigorous alfalfa stands up better to potato leafhopper populations than stressed alfalfa. Grass-alfalfa mixtures tend to have less potato leafhopper damage than pure alfalfa.

**19. Correct Answer: B, Bulletin 545**

Explanation: Integrated pest management (IPM) is the integration of biological, chemical, and cultural pest control methods into a management system that takes into consideration all relevant interactions that management actions may have upon the environment. Because IPM considers all applicable methods, it is also assumed that emphasis on chemical methods may be reduced. However, this is not always true. For example, potato leafhopper can cause significant injury to the alfalfa plant at very low population levels. Because of this, regular monitoring has resulted in pointing out the need for additional sprays.

**20. Correct Answer: A**

Explanation: The economic threshold is the point where insects have done enough damage to warrant treatment. Applying an insecticide will likely produce a positive economic response that offsets the cost of application.

**21. Correct Answer: B**

Explanation: Planting spring seedlings as early as possible enables maximum alfalfa growth before the annual influx of potato leafhoppers and also allows growers to take advantage of early moisture conditions for growth. Granular insecticide preplant will not be applicable to alfalfa, nor will spraying the ground prior to emergence. Insecticides should be applied only after sweep-net assessment.

**22. Correct Answer: E**

Explanation: Any one of the above, or a combination, can be used for pest management. The method chosen depends on the assessment of risks a grower is willing to tolerate. All the methods have a place in the control of insect pests. Field scouting is very important when assessing an insect situation. Rescue treatment should not be applied at random. Insecticides should be handled with the same care as herbicides. Read all labels thoroughly.

**23. Correct Answer: B, Bulletin 545**

Explanation: If treatment of growth is being considered it is advisable to allow 4 to 8 inches of regrowth to develop before applying a treatment to enable sufficient regrowth to hold an effective residue. If a treatment is applied too early, the later period of stand development may become susceptible to potato leafhopper populations that become re-established.

# Forage-Crop Insect Control

## Score Card

No. of Questions Answered Correctly	% Correct	Evaluation
20-23	> 90%	<b>Excellent</b> — You have a very good understanding of forage-crop insects and their control. Proceed to the next unit.
19	> 80%	<b>Good</b> — Be sure you understand those questions you missed. It may help to read <i>Insect Pests of Field Crops</i> again and re-answer the questions you missed.
17-18	> 70%	<b>Needs Improvement</b> — Your score indicates a borderline level of expertise. Be sure to read <i>Insect Pests of Field Crops</i> again and re-answer the questions you missed.
0-16	< 70%	Re-read <i>Insect Pests of Field Crops</i> and work through previous section of the workbook again.

**Disease Control**

# **Ohio Pesticide Applicator Training**

**Forage Crops**

# Forage-Crop Disease Control

*Author: Roger Bender, County Extension Agent, Agriculture*

1. Optimum disease control can be enhanced by:
  - A. Proper fertilization
  - B. Improved weed control
  - C. Proper seedbed preparation
  - D. All of the above
  - E. None of the above
  
2. Proper identification of diseases:
  - A. Takes too long if the corrective treatment is to be timely
  - B. Is not necessary if broad-spectrum fungicides are used
  - C. Has little to do with long-term prevention and control strategies
  - D. All of the above
  - E. None of the above
  
3. Integrated Pest Management (IPM) practices should be used for all crop pest control, including diseases, insects, and weeds.
  - A. True
  - B. False
  
4. No chemical control methods are recommended for alfalfa leaf diseases.
  - A. True
  - B. False
  
5. The disease generally most damaging to alfalfa is:
  - A. Common leaf blight
  - B. Stem canker
  - C. Phytophthora Root Rot
  - D. None of the above
  
6. Fungicides are:
  - A. Pesticides
  - B. Insect control agents
  - C. Disease control products
  - D. Harmless
  - E. A & C
  
7. Which of the following conditions makes alfalfa more susceptible to Phytophthora root rot?
  - A. Significant soil compaction
  - B. Excessive rainfall
  - C. Lack of resistance
  - D. B & C
  - E. A, B & C

1. **Correct Answer: D, Bulletin 631**  
Explanation: Good agronomic practices like proper seeding rates, seeding dates, balanced fertility, crop rotation, weed control, insect control, and seedbed preparation help control diseases.
  
2. **Correct Answer: E, Bulletin 631**  
Explanation: The key to successful disease control is correct identification of disease problems. This can be done quickly by using publications with color photographs and/or advice from competent sources. Proper identification is essential for both short- and long-term disease prevention and control.
  
3. **Correct Answer: A, Bulletin 472**  
Explanation: Integrated Pest Management, while having many definitions, involves the use of economically and environmentally sound practices. IPM helps crop producers identify all pests, determine the need for control methods, and choose the appropriate combination of control methods for the situation. (General IPM definition derived from several publications.)
  
4. **Correct Answer: A, Bulletin 631**  
Explanation: Although several leaf diseases are common every year, they seldom destroy enough tissue to reduce yield. All varieties show susceptibility, and continuous cropping may increase the problem. No chemical controls are recommended.
  
5. **Correct Answer: C, Bulletin 631**  
Explanation: Although there are more than a dozen different diseases of alfalfa, stem and root diseases caused by *Phytophthora* and anthracnose are the most serious.
  
6. **Correct Answer: E, Bulletin 825, *Applying Pesticides Correctly***  
Explanation: The general term “fungicide” is often used to describe chemicals that combat fungi.
  
7. **Correct Answer: E, Bulletin 631**  
Explanation: Excessive rainfall, poor drainage (possibly due to compaction) and lack of genetic resistance could all be factors relating to alfalfa’s susceptibility to *Phytophthora* root rot.



8. When planning a crop disease management strategy, a farmer should:
- A. Refer to field histories in planning rotations and fertilization
  - B. Obtain hybrid and varietal publications from Extension and private sources to assist in selecting seed supplies
  - C. Collect publications with color identification photographs
  - D. Obtain correct identification of disease problems that have occurred on the farm
  - E. All of the above
9. Wilted and bleached alfalfa stems are characteristics of anthracnose.
- A. True
  - B. False
10. Reducing traffic in an alfalfa field:
- A. Only helps in poorly drained areas
  - B. Would have no effect on disease control
  - C. Helps reduce compaction
  - D. All of the above
  - E. None of the above
11. Forage-stand longevity is enhanced by use of:
- A. Optimum fertilization
  - B. Proper cutting schedules
  - C. Good surface and subsurface drainage
  - D. Appropriate pest control practices
  - E. All of the above
12. Which of the following is not an important alfalfa disease?
- A. Spring black stem
  - B. Anthracnose
  - C. Verticillium wilt
  - D. Barley yellow dwarf
  - E. None of the above
13. Which of the following are diseases of red clover and alfalfa?
- A. Stewart's bacterial leaf blight
  - B. Gibberella Stalk rot
  - C. Sclerotinia crown and stem rot
  - D. Septoria leaf blight
  - E. B & D
14. Use of proper seeding techniques:
- A. Includes planting into a well-prepared seedbed or using minimum tillage practices
  - B. Has little to do with avoiding diseases
  - C. Will not improve stand longevity
  - D. A, B & C
  - E. A & C only

8. **Correct Answer: E**, Bulletin 631

Explanation: The cornerstone of successful disease control is correct identification of disease problems. Producers facing specific problems can fine-tune their disease control strategies to those few diseases encountered each year. Those with little experience identifying diseases should seek help from competent sources. Several publications are available that provide color photos of the major diseases and complete descriptions of factors affecting their development. These publications are available through county offices of Ohio State University Extension. Disease samples can be submitted to the Plant and Pest Diagnostic Clinic at The Ohio State University for diagnosis.

9. **Correct Answer: A**, Bulletin 631

Explanation: Wilted and dead bleached stems are anthracnose characteristics that are preceded by cankers with light-brown centers that develop on the stems.

10. **Correct Answer: C**

Explanation: Reducing traffic in an alfalfa field helps reduce compaction in addition to limiting crown injury to the plants.

11. **Correct Answer: E**, Bulletin 631

Explanation: Good management practices enhance forage-stand longevity. Utilizing integrated pest management, fertilizing according to soil test results, cutting at proper times and improvement of soil drainage are all recommended strategies.

12. **Correct Answer: D**, Bulletin 631

Explanation: Spring black stem, anthracnose and Verticillium wilt are all important alfalfa diseases. Barley yellow dwarf is a small-grain disease.

13. **Correct Answer: C**, Bulletin 631

Explanation: Sclerotinia is a disease affecting a number of legumes, including clover and alfalfa. Stalk rot and Stewart's bacterial leaf blight are corn diseases, and Septoria is a soybean and wheat disease.

14. **Correct Answer: A**, Bulletin 631

Explanation: Proper seeding techniques are essential to reduce the likelihood of diseases and enhance the longevity of a stand. Band seeding into a well-prepared seedbed that has been properly fertilized will contribute to the health and longtime productivity of a stand.

15. Fungicide use in alfalfa production is a preventive rather than a corrective control.
- A. True
  - B. False
16. The use of Apron or Ridomil for alfalfa:
- A. Controls all leaf diseases
  - B. Eliminates the need for Phytophthora-resistant varieties
  - C. Has no merit in a spring seeding
  - D. None of the above
17. Alfalfa yield loss from leaf diseases:
- A. Is most severe when hay is cut on a 45- to 50-day schedule
  - B. Causes loss of green leaf tissue resulting in lowered photosynthesis
  - C. May result in lower protein levels in hay
  - D. A, B & C
  - E. None of the above
18. Clean tillage does not help reduce fungus diseases in alfalfa or red clover.
- A. True
  - B. False
19. Which of the following tends to increase the severity of anthracnose or Phytophthora?
- A. Excessive rainfall
  - B. Crop rotation
  - C. Soil potassium level of 400 lbs. K/A
  - D. None of the above
20. Rotating of a field from alfalfa or clover for two years:
- A. Increases the incidence of Phytophthora root rot
  - B. Favors the development of Sclerotinia
  - C. Helps control Verticillium wilt
  - D. None of the above
21. Widespread problems with Sclerotinia in alfalfa and red clover would more likely occur:
- A. When seeded in April
  - B. When no-tillage is used
  - C. When seeded into an existing sod
  - D. When seeding in late August
  - E. B, C & D
22. Phytophthora root rot is an important disease of orchardgrass and timothy.
- A. True
  - B. False

15. **Correct Answer: A**, Bulletin 631  
Explanation: The only fungicides labeled for alfalfa are applied to the seed, prior to planting, or at planting. They are used as a preventative measure to reduce the incidence of disease rather than being applied after the disease is observed.
16. **Correct Answer: D**, Bulletin 631  
Explanation: Apron seed treatment or Ridomil do not control leaf diseases or eliminate the need for resistant varieties.
17. **Correct Answer: D**, Bulletin 631; Bulletin 472  
Explanation: Foliage diseases of alfalfa may cause considerable loss of leaves, particularly if harvest is delayed. Lower protein levels would be expected as a result. Any reduction of green leaf tissue would reduce photosynthesis.
18. **Correct Answer: B**, Bulletin 631  
Explanation: Burying crop residues helps lessen the chance of fungus diseases by enhancing decomposition of plant material and death of the disease-causing fungi.
19. **Correct Answer: A**, Bulletin 631  
Explanation: Crop rotation helps break up disease cycles and good fertility improves the health of alfalfa, while too much rain would increase problems with Phytophthora and anthracnose.
20. **Correct Answer: C**  
Explanation: Rotation of fields away from legumes such as alfalfa and clover generally helps in control of Sclerotinia, Verticillium, and foliage diseases.
21. **Correct Answer: E**, Bulletin 631  
Explanation: Using clean tillage in a spring seeding helps lessen the chance of Sclerotinia infecting alfalfa or red clover seedings. Conversely, an August no-till seeding into an existing sod would greatly increase the possibility of an infection.
22. **Correct Answer: B**, Bulletin 631  
Explanation: While Phytophthora is a major disease of legumes, such as alfalfa, grasses like orchardgrass and timothy would not be adversely affected by this disease.

23. Disease in a forage crop most likely occurs when:

- A. Resistant varieties are grown
- B. Environmental conditions favor infection
- C. Pathogens attack a vulnerable plant
- D. B & C
- E. All of the above

24. The use of fungicides is the primary control method of forage-crop diseases.

- A. True
- B. False

25. Sclerotinia in alfalfa:

- A. Attacks the crown and stem, reducing plant stand
- B. Is usually more severe when alfalfa is no-tilled in late summer
- C. Is usually observed during hot, dry weather
- D. A & B
- E. None of the above

26. To maximize alfalfa performance:

- A. Select disease-resistant varieties
- B. Plant in a well-drained soil
- C. Fertilize and lime according to soil test
- D. Maintain a proper harvest schedule
- E. All of the above

27. Selecting resistant varieties has no merit in forage disease control.

- A. True
- B. False

28. Fescue toxicosis:

- A. Can destroy fescue pasture
- B. Occurs only when wet weather persists
- C. Affects livestock grazing on infected pastures
- D. Can be avoided by renovating pastures with endophyte-free seed
- E. C & D

23. **Correct Answer: D**, Bulletin 631

Explanation: Field crop diseases occur when pathogens attack susceptible plants during environmental conditions that favor infection and growth of the pathogen (disease causing organism such as a fungus) within the plants.

24. **Correct Answer: B**, Bulletin 631

Explanation: Most measures prescribed for control of field-crop diseases are nonchemical, simply because fungicides and other disease control chemicals are expensive. Use of resistant varieties and hybrids and good agronomic practices, such as proper fertilization, help control diseases.

25. **Correct Answer: D**, Bulletin 631

Explanation: The best cultural practice to minimize the problem is to spring-seed alfalfa into conventionally tilled soil.

26. **Correct Answer: E**, Bulletin 631

Explanation: When planning a long-term alfalfa stand, properly fertilizing and liming a well-drained soil are critical first steps. After establishing a disease-resistant variety, cutting at appropriate times, maintaining optimum fertility and utilizing IPM techniques will help maximize performance.

27. **Correct Answer: B**, Bulletin 631

Explanation: Alfalfa breeders are continuing to add genetic resistance to a number of diseases. Purchasing resistant varieties is an important step in avoiding disease problems.

Key diseases that can be controlled with resistant varieties include:

Phytophthora Root Rot

Bacterial Wilt

Fusarian Wilt

Verticillium Wilt

Anthractnose

Aphanomyces Root Rot

28. **Correct Answer: E**, Bulletin 472

Explanation: Fescue toxicosis is a livestock disease that affects only those animals grazing on infected pastures. Although it does not inhibit the growth of the pasture, infected pastures should be renovated with endophyte-free seed to avoid livestock problems.

29. Interseeding alfalfa into an existing stand is usually successful.

- A. True
- B. False

30. Alfalfa grown in a soil with a pH of 6.8 vs. 6.0 would likely be:

- A. More vigorous
- B. Less susceptible to disease
- C. A & B
- D. None of the above

29. **Correct Answer: B**, Bulletin 631

Explanation: Interseeding alfalfa into an existing stand usually exposes new seedlings to an extraordinary amount of disease organisms, generally resulting in poor survival. It is not recommended.

30. **Correct Answer: C**, Bulletin 472

Explanation: A soil with a pH of 6.8 would likely produce more vigorous alfalfa plants than one with a more acid 6.0 pH reading. As a result, the plants would probably be less susceptible to disease.



# Forage-Crop Disease Control

## Score Card

No. of Questions Answered Correctly	% Correct	Evaluation
27-30	> 90%	<b>Excellent</b> — You have a very good understanding of forage-crop diseases and their control.
24-26	> 80%	<b>Good</b> — Be sure you understand those questions you missed. It may help to read the “Field Crop Disease Management” section again and re-answer the questions you missed.
21-23	> 70%	<b>Needs Improvement</b> — Your score indicates a borderline level of expertise. Be sure to read the “Field Crop Disease Management” section again and re-answer the questions you missed.
0-20	< 70%	Re-read the “Field Crop Disease Management” section and work through the workbook again.