

# **MID-ATLANTIC REGION CERTIFIED CROP ADVISER**

**PERFORMANCE OBJECTIVES**

**INTEGRATED PEST MANAGEMENT COMPETENCY AREAS**  
**Revised March 2006**

**MID-ATLANTIC CERTIFIED CROP ADVISER (CCA) PROGRAM PERFORMANCE OBJECTIVES  
INTEGRATED PEST MANAGEMENT (IPM) COMPETENCY AREAS:**

- 1 Management of weeds
- 2 Management of plant diseases
- 3 Management of insects and other invertebrates
- 4 Integrated pest management principles

**Competency Area 1 - Management of weeds**

1. Identify the following weeds by common name at the first true-leaf stage and at plant maturity, and classify each by life cycle. Be able to distinguish among rhizomes, stolons, aerial bulblets, and nutlets.
  - a. Giant foxtail
  - b. Johnsongrass
  - c. Yellow nutsedge
  - d. Barnyardgrass
  - e. Quackgrass
  - f. Fall panicum
  - g. Canada thistle
  - h. Common cocklebur
  - i. Common chickweed
  - j. Henbit
  - k. Shattercane
  - l. Velvetleaf
  - m. Morningglory, ivyleaf
  - n. Wild mustard
  - o. Field pansy
  - p. Ragweed, giant
  - q. Pigweed, smooth
  - r. Milkweed, common
  - s. Prickly sida
  - t. Spurred anoda
  - u. Pennsylvania smartweed
  - v. Spiny amaranth
  - w. Morningglory, pitted
  - x. Morningglory, tall
  - y. Horseweed
  - z. Italian ryegrass
  - aa. Ragweed, common
  - bb. Burcucumber
  - cc. Jimsonweed
  - dd. Wild garlic
  - ee. Crabgrass, large
  - ff. Crabgrass, smooth
  - gg. Horsenettle
  - hh. Eastern black nightshade
  - ii. Cutleaf evening primrose
  - jj. Bermudagrass
  - kk. Common pokeweed
  - ll. Common lambsquarter
  - mm. Broadleaf signal grass
  - nn. Corn speedwell
  - oo. Bladder campion
  - pp. Trumpet creeper
2. Describe factors that influence performance of soil-applied herbicides.
3. Describe factors that influence performance of postemergence herbicides
4. Recognize the factors that cause herbicide drift of both soil-applied and postemergence herbicides.
5. Distinguish between drift and volatilization and how would you minimize both of them.
6. Describe how the following factors influence herbicide persistence and/or carryover
  - a. soil texture
  - b. soil moisture
  - c. soil pH
  - d. temperature
  - e. cation exchange capacity
  - f. organic matter
  - g. herbicide rate
  - h. herbicide family
  - i. tillage
  - j. crop rotation
  - k. sludge application
  - l. sunlight
7. Understand the advantages and disadvantages of utilizing herbicide resistant crops.

8. Recognize factors contributing to the development of herbicide resistant weeds.
9. Classify herbicides by mode of action.
10. Recognize crop and weed injury based on herbicide mode of action.
11. Describe the effect of tillage systems on weed populations.
12. Recognize the effect of weed competition on crops.
13. Understand what factors of weed biology contribute to a weed's competitiveness.
14. Recognize factors that influence herbicide contamination of ground and surface water.
15. Distinguish control approaches for annual versus perennial weeds.
16. Describe how adjuvants affect herbicide activity.
17. Understand the factors that go into making a herbicide recommendation.
18. Identify strategies to manage herbicide resistant weeds
19. Identify strategies for managing the use of multiple herbicide resistant crops in the same cropping rotation.
20. Distinguish characteristics and abbreviations for the following pesticide formulations
 

a. wettable powder	f. dusts
b. emulsifiable concentrate	g. pellets
c. liquids	h. granules
d. water dispersible granules	i. flowable
e. soluble powder	j. dry flowable
21. List proper mixing order for formulations listed in # 19 when adding materials to a spray tank.

## Competency Area 2 - Management of plant diseases

22. Use host plant symptoms and/or signs to identify the following diseases. Classify each disease in #17 as fungus, bacteria, virus, or nematode.

### Corn

- |                          |                              |
|--------------------------|------------------------------|
| a. Nematodes             | f. Northern corn leaf blight |
| b. Maize dwarf mosaic    | g. Southern corn leaf blight |
| c. Maize chlorotic dwarf | h. Carbonum leaf blight      |
| d. Stalk rots            | i. Gray leaf spot            |
| e. Ear rots              | j. Rust                      |

### Soybean

- |                           |                          |
|---------------------------|--------------------------|
| k. Damping off            | q. Soybean cyst nematode |
| l. Root rots              | r. Root knot nematode    |
| m. Tobacco Ringspot       | s. Soybean mosaic        |
| n. Sclerotinia white mold | t. Septoria leaf spot    |
| o. Pod and stem blight    | u. Charcoal rot          |
| p. Anthracnose            | v. Soybean rust          |
|                           | w. Sudden death syndrome |

### Wheat

- |                   |                          |
|-------------------|--------------------------|
| x. Powdery mildew | bb. Take-all             |
| y. Leaf rust      | cc. Barley yellow dwarf  |
| z. Septoria       | dd. Wheat spindle streak |
| aa.. Scab         | ee. Loose smut           |
|                   | ff. Stripe rust          |

### Alfalfa

- |                            |                        |
|----------------------------|------------------------|
| gg.. Phytophthora root rot | kk. Spring blackstem   |
| hh. Anthracnose            | ll. Root knot nematode |
| ii. Sclerotinia crown rot  | mm. Verticillium wilt  |
| jj. Leaf spots             | nn. Aphanomyces        |

23. For each of the above diseases indicate factors and locations that favor their development.
24. For the above diseases be able to determine which cultural and/or chemical control might be beneficial in obtaining economic levels of disease control.
25. Distinguish among protectant, systemic and eradicated fungicides. Use treatment thresholds to make control decisions.

### Competency Area 3 - Management of insects and other invertebrates

26. Identify immature and adult stages of the following pests.

- Classify each pest in #22 as having complete or incomplete metamorphosis
- Describe the type of injury and the crop stage when each pest in # 25 causes economic damage

#### Corn

- a. True armyworm
- b. Slugs
- c. Stinkbug
- d. Northern corn rootworm
- e. Western corn rootworm
- f. European corn borer

- g. Cutworms
- h. Seedcorn maggot
- i. Stalk borer
- j. Wireworms
- k. Fall armyworm
- l. Corn flea beetle

#### Soybean

- m. Grasshopper
- n. Green cloverworm
- o. Spider mites
- p. Mexican bean beetle
- q. Corn earworm
- r. Stinkbug
- s. Bean leaf beetle
- t. Soybean aphid

#### Alfalfa

- u. Alfalfa weevil
- v. Potato leafhopper
- w. Blue alfalfa aphid
- x. Garden webworm

#### Wheat

- y. Aphids
- z. True armyworm
- aa. Cereal leaf beetle
- bb. Grass sawfly

#### Forage Grasses

- cc. Aphids
- dd. Cereal rust mites
- ee. Billbugs
- ff. White grubs

27. Describe non-pesticide control options for pests in #25.
28. List several factors and explain how they influence insect populations.
29. Recognize how the following factors influence insect management decisions
- insect life cycles
  - crop growth stage
  - cultural practices
  - beneficial organisms
  - environmental factors
  - economic factors (crop value, control costs)
30. Describe the role played by beneficial insects (predators and parasites) and fungal pathogens in pest management systems.
31. Distinguish between predatory and parasitic insects.
32. Identify the immature and adult stages of the following beneficial insects from a photo: ladybug, lacewing, syrphid, nabid, minute pirate bug.
33. Know how proper sampling and decision making procedures are used to make an insecticide recommendation.
34. Classify insecticides by their mode of action.
35. List types of insecticide formulations.
36. Describe factors that influence insecticide resistance.
37. Explain the underlying principles of the following resistance management approaches: rotation of chemical modes of action; high dose/refuge; adherence to treatment thresholds coupled with non-chemical tactics.

#### **Competency Area 4 - Integrated pest management principles**

38. Recognize the key strategies used in the implementation of an IPM program.
39. Describe how economic thresholds are used to make pest management decisions.
40. Explain the importance of sampling pest populations and the need for using adequate sample size to estimate an organisms numbers.
41. List types of pest monitoring methods and the advantages and disadvantages of each.
42. Develop a scouting plan for a crop using
  - a. critical periods for crop yield loss
  - b. identification of the pest complex
  - c. information on how the crop will be marketed
  - d. average crop price per unit
43. Recognize the various elements involved in making IPM recommendations: economic, environmental, health, and social.
44. Describe the importance of field history in pest management decisions.
45. List the limitations and strengths of the integrated pest management approach.

## MID-ATLANTIC CERTIFIED CROP ADVISER EXAM INTEGRATED PEST MANAGEMENT (IPM) COMPETENCY AREAS REFERENCE MATERIALS

### Websites- General Information

<http://www.ext.vt.edu/>

<http://www.wvu.edu/~exten/>

<http://www.agnr.umd.edu/CES/>

<http://ag.udel.edu/extension/index.html>

<http://www.rce.rutgers.edu/>

<http://www.udel.edu/IPM>

### Competency Area 1 – Management of weeds

1. WEEDS OF THE NORTHEAST. Cornell University Press, Sales Office, Sage House, 512 East State Street, Ithaca, NY 14850. \$ 30.  
XID- Weed Identification CDROM  
XID CD Rom  
XID Services, Inc.  
PO Box 272  
Pullman, WA 99163  
Or Weed Science Society of America Website (WSSA.net)
2. Weeds of the North Central States North Central Regional Research Publication NCR#281 -Black and white line drawings of mature weeds ([http://www.extension.uiuc.edu/~vista/html\\_pubs/WEEDS/list.html](http://www.extension.uiuc.edu/~vista/html_pubs/WEEDS/list.html))  
- Cost: \$15.00
3. Weed Identification Manual and/or SWSS ‘Interactive Encyclopedia of North American Weeds’ DVD-ROM  
Southern Weed Society  
c/o Weed Society of America 309 W Clark St  
Champaign, IL 61820  
- Cost: \$100.00 +
4. Identifying Seedling and Mature Weeds North Carolina Ag Extension Service – NC Ag #-208 or North Carolina Ag Research Service – NCS ARS Bulletin 461 Raleigh, NC -Color pictures of various growth stages of 90 weeds
5. Field Guide to Wildflowers of Northeast and North Central North America by Roger Torey Peterson Houghton-Mifflin Publishing Co. Boston, MA ISBN-0-395-183251
6. Some Grasses of the Northeast – Field Manual No. 2 by C.E. Phillips -A key to their identification by vegetative characters  
University of Delaware  
Newark, DE 19717-1303  
Phone: 302-831-1125

## **Competency Area 2 – Management of plant diseases**

1. The American Phytopathological Society 3340 Pilot Knob Road St. Paul, MN 55121-2097 Phone: 1-800-328-7560 (<http://www.shopapspress.org/disease-diagnostic-series.html>)
  - a. Compendium of Wheat Diseases, 2<sup>nd</sup> edition - \$49.00
  - b. Compendium of Corn Diseases, 3<sup>rd</sup> edition - \$49.00
  - c. Compendium of Barley Disease, 2<sup>nd</sup> edition - \$49.00
  - d. Compendium of Soybean Diseases, 4<sup>th</sup> edition - \$49.00
  - e. Wheat Health Management
2. Winrock International Agribookstore 1611 North Kent Street Arlington, VA 22209-2134 Phone: 703-525-9455  
  
Common Diseases of Small Grain Cereals – A Guide to Identification by F.J. Zillinsky  
International Maize and Wheat Improvement Center  
- Cost: \$25.00

## **Competency Area 3 – Management of insects and other invertebrates**

1. 2006 Pest Management Recommendations for Field Crops, Bulletin 237, Cooperative Extension Service, University of Maryland, University of Delaware, Virginia Polytechnic Institute and State University and West Virginia State University - Available from local Cooperative Extension Office
2. The American Phytopathological Society 3340 Pilot Knob Road St. Paul, MN 55121-2097 Phone: 1-800-328-7560 <http://www.shopapspress.org/titles-by-category-integrated-pest-management.html>

## **Competency Area 4 – Integrated pest management principles**

- 1 Entomology and Pest Management by Larry P. Pedigo Macmillan Publishing Company 866 Third Avenue New York, NY 10022 Also available at University Libraries
2. . Integrated Pest Management for Corn and Soybeans Cooperative Extension, University of Maryland Video – 60 minutes long -pest identification, sampling and decision making for corn and soybean pests Contact:  
Department of Entomology  
University of Maryland  
Phone: 301-405-3913
3. The American Phytopathological Society 3340 Pilot Knob Road St. Paul, MN 55121-2097 Phone: 1-800-328-7560 (<http://www.shopapspress.org/titles-by-category-integrated-pest-management.html>)
  - a. Handbook of Soybean Insects - \$59.00
  - b. Insect Pests of Small Grains - \$65.00
  - c. Handbook of Corn Insects - \$59.00