ROCKY MOUNTAIN

CERTIFIED CROP ADVISER

Local Performance Objectives
For Exams and Continuing Education Programs

Montana and Wyoming Agricultural Business Associations
Montana and Wyoming Departments of Agriculture
Montana and Wyoming Departments of Environmental Quality
Montana State University Extension Service
University of Wyoming Extension Service
Montana and Wyoming USDA Natural Resource Conservation Services

April 2008

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INTRODUCTION

Rocky Mountain Certified Crop Adviser Performance Objectives

The Certified Crop Adviser (CCA) Performance Objectives outline the knowledge and skill areas that are covered on the Rocky Mountain Certified Crop Adviser Examination and in continuing education programs. These performance objectives should be used to help you prepare for the examination. All the questions on the examination are based directly on the performance objectives. Questions on the Rocky Mountain Certified Crop Adviser Exam were developed by: Montana State University and the University of Wyoming; Montana and Wyoming Departments of Agriculture; Montana and Wyoming Natural Resources Conservation Service; Montana and Wyoming Departments of Environmental Quality; and Nancy Matheson and others, Alternative Energy Resources Organization.

The Performance Objectives are divided into four sections 1. Nutrient Management; 2. Soil and Water Management; 3 Pest Management and 4. Crop Management.

The National Performance Objectives were developed by Dr. Jim Vorst of Purdue University and were reviewed by 300 persons involved in crop advising. They are revised annually by academics and practitioners. They also provide the framework for the Rocky Mountain CCA Performance and Objectives.

The Performance Objectives also serve as the guide for the continuing education part of the CCA program. Once certified, you, the Crop Adviser, will be required to demonstrate participation in continuing education programs. You will have to describe your continuing education activities by competency area and specific performance objectives.

As you participate in the Continuing Education portion of the CCA program, you may want to use the Performance Objectives to help you decide those areas you wish to learn more about. It will also help you describe your continuing education credits, so you can demonstrate to your Regional Board that your credits meet recertification requirements.

Since the Performance Objectives have been developed over the material that Certified Crop Advisers need to know, they are the base on which the entire CCA program is built. The continuing education program is designed to provide further educational opportunities in the five competency areas. The learning process is ongoing, and this booklet can help you direct your learning and identify those areas and competencies in which you need further study. The first step is adequately mastering the material covered in the Performance Objectives to pass the examination. The second step is to upgrade yourself by pursuing training in those areas that you need further study. In this way you will maintain or increase your proficiency as a Crop Adviser, and will insure the credibility and success of all those who have earned the Certified Crop Adviser designation.

ROCKY MOUNTAIN

CERTIFIED CROP ADVISER

NUTRIENT MANAGEMENT COMPETENCY AREAS

I Basic concepts of soil fertility

II Nutrient movement in soil and water

III Soil reaction and soil amendments

IV Basic concepts of plant nutrition

V Soil and plant test reports and nutrient recommendations

VI Nutrient source and applications

VII Nutrient management planning

VIII Ag emergency preparedness

1) Recognize how soil, climatic, and nutrient properties affect nutrient movement in soil or water

2) Recognize how cropping systems affect nitrogen, phosphorus, potassium, and sulfur management

3) Recognize how soil drainage, irrigation, precipitation levels, and potential for water contamination affect nitrogen management practices

4) Recognize the analysis, physical form, and handling precautions of nitrogen, phosphorus, potassium, and sulfur nutrient sources

5) Recognize how soil properties and nutrient cycling processes affect nutrient management

6) Describe soil and plant sampling and handling procedures

7) Recognize the philosophies in soil and plant testing programs

8) Interpret a soil and plant test report

9) Given soil and plant test reports and calibration data, develop economically and environmentally sound nutrient recommendations

10) Distinguish the function and mobility of nutrients in plants by growth stages

11) Use nutrient analysis information to calculate amounts of nutrients to be applied to meet a specific recommendation

12) Calculate nitrogen and phosphorus contributions from animal manure, biosolids, irrigation water, fertilizer, organic material, legumes, urban/industrial waste, and soil organic matter

13) Recognize how nutrient placement and time of application affect nutrient availability

14) Determine field variability to apply precision nutrient management practices

15) Describe how the carbon:nitrogen ratio of soil organic materials may affect soil nitrogen availability to plants

16) Develop a comprehensive nutrient management plan that is both economically and environmentally sound.

17) Develop maps of materials with high aecurity risk (anhydrous ammonia, ammonium nitrate)

18) Maintain risk assessments and mitigation plans

19) Describe the benefits of Precision Agriculture as related to nutrient management

20 Describe ways can satellite imagery be used for fertilizer application, predicting yield and efficient use of fertilizer

SOIL AND WATER MANAGEMENT COMPETENCY AREAS

I Basic physical properties of soils

II Water and solute movement in soils

III Residue management practices

IV Site characterization

V Plant/Water relations

VI Water quality

VII Ag emergency preparedness

1) List characteristics of gravel, sand, silt and clay

2) Describe how residue management practices and cropping systems affect soil productivity

3) List sources of soil organic matter

4) Describe the relationship between soil organic matter and soil color, soil structure, soil nutrient-supplying ability, and erosion

5) List ways to maintain and improve soil organic matter levels and soil health

6) Recognize how soil physical properties and cropping and tillage systems are related to soil drainage and plant available water

7) Differentiate among the different types of water and wind erosion

8) Describe the effects of soil water status on plant nutrients and uptake

9) Describe how climate and soil water affect plant water relations

10) Describe how soil physical and chemical properties affect solute movement

11) List physical factors which affect the rate of erosion

12) Know how to estimate percent residue

13) In a given situation, list economically sound management alternatives that will result in soil conservation

14) Recognize how tillage operations influence soil structure, compaction, and soil organisms

15) Recognize the difference between saline, sodic and saline-sodic soils

16) Determine the relative difference of plant tolerance to salts and sodium

17) Recognize how conservation practices impact water erosion and environmental quality

18) List soil and water management practices that reduce sediment, nutrient and pesticide transport to protect water quality

19) Describe techniques for dryland and irrigated water management

20) Use soil survey and other information sources to make sound land management decisions

21) Determine field variability to apply precision soil and water management practices

22) Describe the appropriate situation to use soil amendments such as lime and gypsum

23) Develop maps to identify potential pathogen risks (ex: manure lagoons)

24) Create land maps and records of sewer, septic tanks, wells and cisterns, streams, wildlife refuge or wetlands, chemical, pesticide and anhydrous ammonia storage and tanks

PEST MANAGEMENT COMPETENCY AREAS

I. Basic integrated pest management practices

II. Management of weeds, plant diseases and insects

III. Calibration of pesticide application equipment

IV. Pesticide resistance

V. Protecting humans and non-target species against pesticide exposure

VI. Ag emergency preparedness

1) Recognize examples of cultural, chemical, and biological pest management
2) Describe advantages and limitations of cultural, chemical, and biological pest management
3) Distinguish between contact and systemic herbicides
4) Recognize the importance of timing in pesticide application
5) Recognize the relationship between plant vigor and herbicide effectiveness in postemergence applications
6) Be able to identify pests based on distinguishing characteristics and damage
7) Identify general plant symptoms caused by different herbicide modes of action
8) List soil and climatic factors that affect pesticide performance and fate in soil and water
9) List the types of disease causing organisms and how they survive and disperse
10) Describe basic principles of disease development
11) Distinguish between systemic and non-systemic fungicides
12) Distinguish between seed, foliar, and soil treatments
13) Define protectant, eradicant, and disinfectant type fungicides
14) Recognize complete and gradual metamorphosis
15) Distinguish between contact insecticides, stomach poisons, and systemic insecticides
16) Recognize the physical characteristics of pesticide formulations
17) Recognize the types of information found on a label
18) Use information on a label to determine proper dosage in a given situation

19) Recognize the relationship between spray boom height and nozzle spacing

20) Calculate the amounts of pesticides needed in a given area to apply a specific rate, either broadcast or banded

21) Use the calibration factors of gallons per acre, gallons per minute, width of nozzle spacing, and ground speed to set up and calibrate a sprayer

22) List factors influencing the development of pesticide resistance

23) List ways to prevent the occurrence of pesticide resistant diseases, insects and weeds

24) List ways to manage pesticide resistant diseases, insects and weeds once they have occurred

25) Describe how pesticide degradation is affected by soil moisture and soil temperature

26) Distinguish between spray drift and spray volatilization

27) Recognize how wind speed, nozzle type, nozzle orifice size, spray droplet size, boom height, evaporation rate, and spray viscosity affect spray drift

28) List pesticide modes of entry into the human system

29) Understand the advantages and limitations of genetically enhanced crops

30) Describe pesticide characteristics that affect pesticide fate in soil and water

31) Distinguish between chronic and acute poisoning effects

32) Recognize general symptoms of acute pesticide poisoning

33) List possible chronic effects of pesticide poisoning

34) Recognize general procedures to follow if pesticide gets on skin, in eyes, in mouth or stomach, or if inhaled

35) Recognize how field scouting and economic injury levels are related to integrated pest management

36) List steps in carrying out an integrated pest management program

37) List the advantages and limitations of integrated pest management

38) Outline methods for sampling plant and pest material

39) Outline methods for submitting plant or pest material to the National Plant Diagnostic Network for diagnosis and lab analysis

40) Recognize economic and environmental factors involved in making a pest management recommendation

41) Describe worker protection standards and where the information is located

42) Describe how to store pesticides safely and handle pesticide spills

43) Determine field variability to apply crop production precision management practices

44) Describe pesticide characteristics that affect pesticide fate in soil and water

45) Know about diseases and pests that are potentially a threat to Montana and the region.

46) Describe ways GPS might aid in fighting noxious or troublesome weeds.

CROP MANAGEMENT COMPETENCY AREAS

I. General crop adaptation

II. Tillage systems used for seedbed preparation of row, small grain and forage crops

III. Hybrid and cultivar (variety) selection

IV. Seeding date, rate, and depth factors

V. Crop damage, mortality, and factors influencing replanting decisions

VI. Cropping systems

VII. Harvest and storage

1) Describe how crops respond to soil fertility levels, soil pH, and drainage

2) Describe how extremes of temperature generally affect the growth and development of a crop

3) Describe how the water needs of a crop typically change during growth and development

4) Define allelopathy

5) Define phytotoxicity

6) Describe the factors that influence harvest and crop quality

7) Describe advantages and limitations of bacterial inoculants

8) Describe the adaptation of agronomically important crops to extremes of precipitation

9) Define the term growing degree day and describe how it is used in crop production systems

10) Describe plant growth and development stages

11) Recognize how environmental and management factors influence the selection of a tillage system

12) Describe the timing and sequence of tillage operations in an intensive tillage system

13) Describe the advantages and limitations of an intensive tillage system

14) Describe the timing and sequence of tillage operations in a reduced tillage system

15) Describe the advantages and limitations of a reduced and no-till system

16) List the characteristics used in selecting a hybrid or cultivar

17) Recognize how storage time, handling, and storage conditions may affect seed quality

18) Define seed dormancy and hard seed

19) Define PLS and calculate % PLS values for seedlots when given percentage purity and percentage germination or seeding rate and the % PLS

20) Recognize consequences of seeding too early or too late

21) List factors that influence the seeding rate of major crops

22) Recognize characteristics of major crops that make them adapted to high or low seeding rates

23) Know how to take a plant population count in a crop field

24) Recognize how crops respond to depth of planting

25) Recognize conditions which would cause recommended seeding depth to be altered

26) Describe climatic and plant factors which influence a plant's ability to resume growth after being damaged

27) Determine when crop damage would justify replanting

28) Compare and contrast single crop systems and crop rotations

29) Describe advantages and disadvantages of green manure

30) Differentiate between summer annuals, winter annual, biennial, and perennial plants

31) Describe how taproot and fibrous root systems differ in erosion control and nutrient uptake patterns

32) List information needed to diagnose a crop production problem in the field

33) Understand and apply the Plant Variety Protection Act

34) Determine field variability to apply crop production precision management practices