Northwest Regional Certified Crop Adviser

Performance Objectives
2025

Prepared by Northwest Regional CCA Board

TABLE OF CONTENTS

Certified Crop Adviser Northwest Regional Performance Objectives

Introduction

The Certified Crop Adviser Performance Objectives outline the knowledge and skill areas that are covered on the Northwest Regional Certified Crop Adviser Examination. The Northwest Regional Performance Objectives are a modification of the National Certified Crop Adviser Performance Objectives that outline knowledge and skill areas needed in the Northwest Region.

These Performance Objectives are dynamic, and will be upgraded, changed, and modified as the needs of the production industry evolve. The Certified Crop Adviser program will then remain a viable and useful tool that will recognize the high level of competence displayed by those who choose to earn this designation.

Key Crops of the Northwest Region		
Alfalfa	Corn	Cover crops
Grass forage crops	Oilseeds: Canola	Potato
Sugar Beet	Tree Fruits	Vineyards
Small Fruits: Blueberry Strawberry Raspberry	Small Grains: Wheat Barley Oats	

Certified Crop Adviser

NUTRIENT MANAGEMENT COMPETENCY AREAS:

1. Basic concepts of soil fertility
2. Nutrient movement in soil and water
3. Soil pH and modification
4. N, P, and K considerations
5. Secondary and micronutrients
6. Soil testing, plant analysis and fertilizer recommendations
7. Fertilizer forms and application
8. Livestock manure and other organic by-products

COMPETENCY AREA 1. Basic concepts of soil fertility

1. The soil as a source of nutrients

1. List the ionic form in which each of the macro and secondary nutrients are available to plants.

2. Describe the role of cation exchange in plant nutrition.

3. Define soil solution and describe its relationship to nutrient mobility.

4. Describe how immobilization and mineralization affect nutrient availability.

5. Describe how soil pH affects nutrient availability.

6. Recognize how cation exchange capacity affects nutrient leaching.

7. Understand nutrient uptake and translocation.

8. Recognize and identify nutrient sources, including. irrigation, H_2O. atmospheric, legume credits, crop residue, manure, compost, etc.

9. Describe how banding versus broadcasting affects nutrient availability.

10. Explain the influence of microbial activity on nutrient cycling and nutrient availability.

2. Assessment of soil productivity based on soil physical properties

1. Describe how texture, structure, organic matter, bulk density, and compaction affect the health and productivity of soil.

COMPETENCY AREA 2. Nutrient movement in soil and water

1. Distinguish between point and non-point sources of entry into the environment and surface and/or groundwater resources.

2. Recognize how soil, climatic, and nutrient properties affect movement of a nutrient in soil or water.

3. Recognize how soil properties, tillage, irrigation practices and cropping patterns affect nutrient runoff and leaching.

4. Understand the forms of N fertilizers commonly applied and their relative immediate potential for leaching and/or volatility.

5. Recognize how application timing affects nutrient runoff and leaching and volatility.

6. Recognize how fall fertilizer applications affect nutrient runoff and leaching.

7. Understand precautions that reduce runoff and nutrient leaching, e.g., tillage practices, filter strips, grass waterways, direct seeding, etc.

COMPETENCY AREA 3. Soil pH and modification

1. Define soil pH and understand the pH scale.

2. List processes or practices that cause soil pH to change.

3. Explain benefits from lowering or raising soil pH.

4. Explain how soil pH and physical properties affect soil processes such as nitrogen volatilization.

5. Explain how excess free lime (calcium carbonate) affects nutrient availability.

6. Describe the purpose of liming and various liming materials and how they affect soil pH.

7. Describe the process of how elemental sulfur and ammonium-based fertilizers impact soil pH.

8. Recognize how pH modification is associated with buffering from soil mineral weathering.

COMPETENCY AREA 4. N, P, and K considerations

1. Nitrogen

1. Understand the role of nitrogen in plants.

2. Recognize general deficiency symptoms and ways to diagnose N deficiency with soil and tissue testing prior to the onset of visual symptoms.

3. Describe the nitrogen cycle and how it affects nitrogen availability.

4. Distinguish the ways nitrogen may become available or lost from the soil or the plant.

5. Understand the process of biological N fixation.

6. Understand how soil physical properties affect the effectiveness of nitrogen fertilizers to supply crop demands for nitrogen.

7. Recognize how cropping systems and agronomic practices affect nitrogen fertilization.

8. Explain how soil drainage, irrigation, precipitation levels, and potential for water contamination affect nitrogen fertilization including organic sources.

9. Understand the safety precautions that should be taken in handling various nitrogen fertilizers such as ammonium nitrate and anhydrous ammonia.

10. Recognize the role of application timing on plant availability and environmental protection.

11. Demonstrate how to incorporate nitrogen contribution from all N sources into fertilizer recommendations.

12. Outline primary environmental concerns in nitrogen use.

2. Phosphorus

1. Understand the role of phosphorus in plants.

2. Recognize general phosphorus deficiency symptoms and ways to diagnose P deficiency symptoms with soil and tissue testing prior to the onset of visual symptoms.

3. Explain how soil properties affect phosphorus fertilization and plant availability.

4. Describe how cropping systems and agronomic practices affect phosphorus fertilization.

5. Understand how the soil retains or loses phosphorus.

6. Recognize the analysis and chemical composition of different phosphorus fertilizers.

7. Explain how nitrogen and phosphorus applications differ relative to water quality pollution.

8. Recognize local phosphorus recommendations and restrictions to be consistent with regulatory phosphorus management plans.

9. Outline the primary environmental concerns with phosphorus emanating from such areas as feedlots, dairies, urban areas, and others.

3. Potassium

1. Understand the role of potassium in plants.

2. Recognize general potassium deficiency symptoms in plants and ways to diagnose potassium deficiency symptoms with soil and tissue testing prior to the onset of visual symptoms.

3. Predict potassium luxury consumption.

4. Understand how the soil retains potassium.

5. Differentiate how soil and irrigation water properties affect potassium fertilization.

6. Explain how cropping systems and agronomic practices affect potassium fertilization.

7. Recognize the analysis and chemical composition of different potassium fertilizers.

COMPETENCY AREA 5. Secondary and micronutrients

1. Recognize the general deficiency and toxicity symptoms of the secondary and micronutrients.

2. Outline methods of correcting secondary and micronutrient deficiencies and toxicities.

3. Explain the effect of soil pH on micronutrient availability.

COMPETENCY AREA 6. Soil testing, plant analysis and fertilizer recommendations

1. Be able to locate a tract of land and give a legal description.

2. Describe the advantages, disadvantages, and limitations of using a county soil survey in determining soil series boundaries and characteristics.

3. Describe soil sampling and handling procedures to include sampling depth, number of cores, selection of areas to sample and sampling patterns, and sources of contamination.

4. Describe how precision agriculture can be utilized in different sampling techniques, i.e., zone sampling, grid sampling as well as sample depth.

5. Understand when to and how to use diagnostic sampling (good vs poor vigor, good vs poor emergence, etc.).

6. Understand soil spatial variability in relation to precision agriculture.

7. Describe the philosophy of soil testing and plant analyses and the role of sampling, analysis, interpretation, and recommendation in making a fertilizer recommendation.

8. Differentiate methods soil testing labs use for analyzing samples and be able to explain the variation in results due to extraction methods.

9. Explain the agronomic importance of items on a soil test and plant analyses reports.

10. Use information from soil test and plant analyses reports to determine economical, environmentally, and agronomically sustainable fertilizer recommendations.

11. Use fertilizer analysis information to calculate amounts of different fertilizers required to meet a specific recommendation.

COMPETENCY AREA 7. Fertilizer forms and application

1. Understand advantages and disadvantages of broadcast versus banded fertilizer applications.

2. Recognize how fertilizer placement and time of application affect nutrient availability and leaching.

3. Understand special environmental concerns associated with fertilizer applications.

4. Understand how nitrogen stabilizers can affect plant availability and reduce loss.

5. Understand fertilizer application equipment operation and calibration, including fertigation.

6. Describe the 4R Nutrient Management program and concepts.

COMPETENCY AREA 8. Livestock manure and other organic by-products

1. Understand calculations related to manure production from animal units, manure types, application, and calibration of application equipment, including irrigation systems.

2. Recognize site calculations and practices that influence manure off-site movement.

3. Understand manure nutrient analysis, including salt index, for determining application rates, manure handling, and sampling practices.

4. Recognize risks, benefits, and limitations of manure applications.

5. Understand nutrient losses associated with manure handling and storage systems.

6. Understand confined animal feedlot ordinances (CAFO) regulatory process.

7. Understand composting principles and odor control practices.

8. Understand compost nutrient analysis, including elevated levels of salt, micronutrients, and herbicide residues for determining application rates, handling, and sampling practices.

Certified Crop Adviser

SOIL AND WATER MANAGEMENT COMPETENCY AREAS:

1. Basic properties of soils
2. Soil water management
3. Soil conservation
4. Tillage operations and soil characteristics
5. Management of saline and sodic soils
6. Soil Health

COMPETENCY AREA 1. Basic properties of soils

1. Soil texture and soil structure

1. Understand characteristics of sand, silt, and clay.

2. Be able to use a textural triangle to determine textural classification of a soil and understand why knowing soil texture is important.

3. Understand the importance of sand, silt and clay in plant growth and management.

4. Understand how soils are formed:
   a. including volcanic soils, alluvial fans, glacial/ice-age impacts, and floodplain features.

5. Understand benefits of well-developed soil aggregation.

6. Recognize how soil organisms, tillage, and cropping systems affect soil structure.

7. Recognize characteristics of soil horizons.

2. Soil organic matter

1. Understand the role of sampling depth and laboratory methods in determining soil organic matter and organic carbon.
   a. Know how to convert OM to OC and vice versa.
   b. Understand the relationship between and utility of different methods, including, Loss on Ignition, Total Organic Carbon, and Walkley Black methods.

2. Understand the role of soil organic matter in pesticide management.

3. Understand the importance of soil organic matter in nutrient management.

4. Recognize how soil organic matter is related to soil color, structure, and soil temperature.

5. Understand how the carbon nitrogen ratio (C:N) of organic materials in the soil may affect the availability of soil nitrogen to plants.

6. Recognize advantages and disadvantages of soil organic matter and the contributions from the living fraction of soil OM, cover crops, crop residues, etc.

7. Recognize how soil organic matter affects soil aggregation, water holding capacity, and water infiltration.

8. Understand ways to maintain the organic matter content of an agricultural soil and recognize the importance of carbon sequestration.

9. Understand the function and diversity of soil microorganisms and their role in soil organic matter.

10. Understand how soil organic matter is created and lost.

COMPETENCY AREA 2. Soil water management

1. Define plant available water.

2. Understand how pore size distribution affects the drainage characteristics and water holding capacities of soils.

3. Recognize how soil texture, soil structure, and soil organic matter affect pore size, soil drainage, and plant available water.

4. Explain how cropping systems and agronomic practices affect infiltration rate.

5. Recognize factors that influence the rate and timing of irrigation.

6. Recognize the role of soil erosion by wind and water in nutrient loss.

7. Recognize how infiltration rate and hydraulic conductivity affects potential groundwater contamination.

8. Explain how sprinkler, furrow, rill, flood, and drip irrigation methods can impact surface and groundwater quality.

9. Understand how to use soil and crop characteristics, ET, and climatic data to develop an irrigation schedule.

10. Understand how irrigation can affect soil temperature.

COMPETENCY AREA 3. Soil conservation

1. Recognize mechanisms and types of water and wind erosion.

2. Outline best management practices (BMPs) that reduce wind and water erosion, as well as reduce runoff and leaching.

3. Describe how soil loss through erosion affects loss of plant nutrients.

COMPETENCY AREA 4. Tillage operations and soil characteristics

1. Explain how tillage operations influence erosion, soil structure, organic matter content, pH, compaction, surface residue, and biological activity.

2. Describe plant symptoms and soil characteristics associated with compaction and impermeable layers.

3. Understand and explain conditions necessary for successful implementation of practices that alleviate compaction.

COMPETENCY AREA 5. Management of saline and sodic soils

1. Define saline, saline-sodic, and sodic soils.

2. Describe how to prevent and reclaim saline, saline-sodic, and sodic soils.

3. Explain the complications associated with irrigation water quality and control of saline conditions.

4. Understand irrigation water sources and irrigation water quality including being able to calculate EC and interpret SAR.

COMPETENCY AREA 6. Soil health

1. Define soil sustainability and soil health.

2. Relate soil health to chemical, physical, and biological soil characteristics.

3. Recognize characteristics of poor soil health and understand how to improve/build soil health.

4. Describe tests that are available to measure soil health.

5. Understand the carbon cycle.

6. Understand the relationship that carbon storage/sequestration, soil organic carbon (SOC) and organic matter (OM) have in the soil.

Certified Crop Adviser

PEST MANAGEMENT COMPETENCY AREAS:

1. Management of weeds
2. Management of plant diseases
3. Management of nematodes
4. Management of vertebrates
5. Management of insects
6. Calibration of pesticide application equipment
7. Using pesticides in an environmentally sound way
8. Protecting against off-target pesticide exposure
9. Integrated pest management

COMPETENCY AREA 1. Management of weeds

1. Weed biology

1. Understand the differences between sedges, grasses, and broadleaf weeds.

2. Understand distinguishing characteristics of annual, biennial, and perennial weeds.

3. Understand weed reproduction and survival strategies, including seed dormancy and rhizome root structures.

4. Know the weeds in the following table:

annual bluegrass	field bindweed	prickly lettuce
bull thistle	foxtail barley	quackgrass
Canada Thistle	foxtail family	redroot pigweed
common lambsquarters	Kochia	Russian thistle
curly dock	mayweed chamomile	shepherds purse
dandelion	mustard family	wild oat
downy brome	nightshade family	yellow nutsedge

2. Weed management practices

1. Understand cultural, chemical, biological, and mechanical weed management.

2. Understand cultural practices used in making non-chemical weed management recommendations including crop rotation, seeding date, organic versus conventional production systems.

3. Understand economic thresholds in their relation to weed populations and crop competition.

4. Understand management strategies for the weeds shown in the table above.

3. Herbicide application

1. Define herbicide persistence in the:
   a. soil, residual that could affect the next crop in the rotation
   b. plant, including crop residue
   c. the marketable portion of the plant
   d. water e.g., irrigation water

2. Understand the difference between contact and systemic herbicides.

3. Explain how adjuvants affect herbicide performance.

4. Recognize the importance of timing in herbicide application.

5. Recognize the relationship between plant vigor and herbicide effectiveness in postemergence applications.

6. Identify general plant symptoms caused by various herbicide mode/mechanism of action groups.

7. Understand environmental and growth factors that affect the performance of herbicides.

8. When making herbicide recommendations, understand how the following factors affect management decisions:
   a. management plan
   b. plant health and outside stressors such as disease and insects
   c. environment factors such as drought

9. Recognize the possible off-target effects of herbicide application
   a. volatility
   b. drift
   c. leaching and runoff
   d. carryover

10. Understand different herbicide modes of action (HRAC groups) and how they relate to weeds controlled and herbicide resistant weeds.

11. Understand differences between soil and foliar applied herbicides.

12. Understand herbicide selectivity.

COMPETENCY AREA 2. Management of plant diseases

1. Biology of plant diseases

1. Understand the disease triangle: favorable environment – virulent pathogen – susceptible host.

2. Recognize symptoms caused by fungi, bacteria, viruses, abiotic factors, and other organisms.

3. Understand systemic acquired resistance (SAR) and how it can impact disease management in a crop.

4. Recognize economically important diseases and their control/suppression for the diseases shown in the table below.

Potato	Small Grain	Corn	Forage Crops	Fruits	Other Crops
bacterial ring rot	bunt/snow molds	ear rot	alfalfa mosaic virus	apple scab	Sugar Beet: water mold
early blight complex	fusarium head blight	smut	CMV (mottle virus)	blueberry scorch	
fusarium	glume blotch	stalk rot	root rot	botrytis	
potato virus Y (PVY)	root rot complex		rusts	bunch rot	
rhizoctonia	rusts to include stripe, leaf, and head		wilt	crown gall	
water mold complex i.e.,: late blight and white mold	take-all			fire blight	
				little cherry disease/X-phytoplasm	
				mummy berry	
				powdery mildew	
				red blotch	
				scab	
				shock	

2. Plant disease management practices

1. Understand cultural, chemical, biological, and genetic disease management.

2. Recognize how to determine plant disease economic threshold levels.

3. Recognize differences between systemic, preventative, and post-infection pesticides.

4. Recognize different strategies involved with the use of seed, foliar, and soil applied pesticides.

5. Explain the importance of rotating different FRAC groups for resistance management.

6. Understand the role biologicals play in managing pesticide resistance and improving efficacy of pesticides with a basis in reputable and repeatable research and results.

COMPETENCY AREA 3. Management of nematodes

1. Understand general nematode biology and management practices for
    a. cyst nematodes
    b. root knot nematodes
    c. lesion nematodes
    d. stubby root nematodes
    e. stem nematodes

2. Identify plant damage symptoms caused by nematodes listed in #1.

3. Describe nematode sampling and monitoring methods as well as economic thresholds.

4. Understand cultural and chemical types of nematode management including cover crops, biofumigant and trap cover crops, soil fumigation, and nematicides.

5. Explain management, plant and environmental factors to include in making recommendations for nematodes.

COMPETENCY AREA 4. Management of vertebrates

1. Understand general vertebrate biology and management practices for
    a. voles
    b. mice and rats
    c. gophers

2. Identify plant damage symptoms caused by vertebrates.

3. Explain cultural and chemical types of vertebrate management including buffer zones, tillage, traps, baits, and pesticides.

COMPETENCY AREA 5. Management of insects

1. Insect biology

1. Understand the differences between hard body and soft body insects.

2. Understand complete and simple metamorphosis.

3. Understand insect life cycles and their impact on cropping systems.

4. Recognize economically important insects and their control/suppression for the insects shown in the table below.

armyworm	green peach aphid	rootworm
blue aphid	leafhoppers	thrips
brown marmorated stink bugs	mites	weevil species
fruit flies	Mormon crickets	wireworm
grasshoppers	potato beetle	

5. Describe the role of beneficial insects along with their lifecycle and threshold population needed to decide between chemical and cultural control measures.
    a. lady bugs
    b. parasitic wasps
    c. lacewing
    d. minute pirate bug
    e. soldier beetle

2. Insecticide application

1. Distinguish among contact insecticides, systemic insecticides, and insect growth regulators.

2. Recognize the importance of insecticide application timing.

3. Understand management, plant and environmental factors used in making insect management recommendations (chemical, cultural, and biological).

4. Explain the importance of beneficial insects and decisions to be made as part of an IPM program.

5. Understand the risks associated with pesticide applications and their potential impact on pollinators.

6. Explain the importance of rotating different IRAC groups for resistance management.

COMPETENCY AREA 6. Calibration of pesticide application equipment

1. Pesticide formulations and labels

1. Recognize the physical characteristics of pesticide formulations including:
    a. Emulsifiable Concentrate (EC).
    b. Soluble Concentrate (SC).
    c. Dry Flowable (DF).
    d. Dry Granule (DG).

e. Wettable Granule (WG).
f. Wettable Powder (WP).
g. Water Soluble Bag/Pouch (WSB/P).

2. Recognize the types of information found on a pesticide label:

   a. Re-entry Interval (REI).
   b. Preharvest Interval (PHI).
   c. use rate.
   d. rotational restrictions.
   e. labeled crops.
   f. Personal Protective Equipment (PPE).
   g. Section 1e or 24c (specialized local use).

3. Use information on a label to determine proper rate in a given situation.

2. Identification of application equipment and critical components

1. Recognize pattern, relative droplet size and primary uses of different nozzle types, e.g., the ASABE Droplet Size Classification Standard.

2. Understand how to determine nozzle tip wear.

3. Understand application techniques, adjuvants, and equipment that avoid or reduce drift.

4. Understand the use of a back siphon to protect water quality.

3. Basic principles of calibration

1. Understand methods used to establish accurate ground speed under field conditions.

2. Explain factors affecting uniform spray coverage.

3. Calculate the amounts of pesticide an applicator applies at a specific rate, either band or broadcast, on a given area.

4. Describe the procedure used to adjust the output of a sprayer.

5. Use the calibration factors of gallons per acre, gallons per minute, width of nozzle spacing, spray pressure, and ground speed to demonstrate how to calibrate a sprayer.

6. Recognize the importance of field calibration to ensure accuracy of application.

COMPETENCY AREA 7. Using pesticides in an environmentally sound way

1. Pesticide movement and degradation in soil and water

1. Distinguish between point source and non-point sources of entry into the environment.

2. Describe the differences between, and the factors leading to, point source and nonpoint source water quality contamination from pesticides commonly used in the Pacific Northwest.

3. Recognize how soil characteristics and properties (including texture and organic matter), environmental, and biological factors affect pesticide movement and degradation in soil and water.

4. Recognize how sandy soil, sinkholes, shallow water table, and water management affect the potential for groundwater contamination.

5. Recognize how location and timing of equipment calibration and maintenance affects the potential for groundwater contamination.

6. Understand the fate of pesticides in groundwater and surface waters.

2. Government regulations

1. Interpret a Safety Data Sheet (SDS) and how it relates to the product as used/applied.

2. Understand the proper disposal procedure for pesticide waste, rinsates, containers, and spills.

3. Understand sources of information to determine toxicity levels, first aid procedures, and other safety and toxicity information.

4. Understand record-keeping regulations for restricted use pesticides.

COMPETENCY AREA 8. Protecting against off-target pesticide exposure

1. Keeping pesticides on target

1. Understand differences between spray drift (particle drift and vapor drift).

2. Recognize factors that affect off-target pesticide movement.
   a. temperature inversion
   b. wind speed and direction
   c. sensitive crops downwind

d. boom height
e. proper operating pressure

3. Understand means of checking for off-target movement during the application.

2. Human toxicity

1. Understand pesticide modes of entry into the human system.

2. Distinguish between chronic and acute poisoning effects.

3. Recognize general symptoms of acute pesticide poisoning.

4. Recognize possible chronic effects of pesticide poisoning.

5. Recognize general procedures to follow if pesticide gets on the skin, in the eyes, in the mouth or stomach, or if inhaled.

3. Handling pesticides safely

1. Recognize that pesticide labels are the best source of information concerning toxicity levels, handling precautions, first aid procedures, and other safety information.

2. Recognize protective gear used during loading, mixing, and application of pesticides.

3. Understand proper cleanup procedures for application equipment and protective gear.

4. Understand proper ways of storing and disposing of pesticide containers.

5. Be able to outline emergency contacts.

COMPETENCY AREA 9. Integrated pest management

1. Recognize how field scouting and economic threshold levels relate to integrated pest management.

2. List, explain, and provide examples of the different forms of IPM: cultural, chemical, biological, physical.

3. Recognize steps in carrying out an integrated pest management program.
4. Understand the advantages and limitations of integrated pest management.
5. Understand and explain how to comply with pesticide label warnings about resistance.

Certified Crop Adviser

CROP MANAGEMENT COMPETENCY AREAS:

1. General crop considerations
2. Tillage systems used for seedbed preparation
3. Hybrid and cultivar (variety) selection
4. Crop damage, mortality, and factors influencing replanting decisions
5. Cropping systems

COMPETENCY AREA 1. General crop considerations

1. Soil conditions

1. Recognize how crops respond to soil fertility, soil pH, soil salinity and soil drainage.

2. Describe the soil pH ranges where agronomically important crops will perform best.

3. Describe how the fertilizer salt index can affect
   a. seed germination.
   b. foliar application.
   c. tank mix compatibility.

2. Climatic adaptation

1. Recognize how the water needs of a crop typically change during growth and development.

2. Understand the implications of local climate and restrictions on Key Crops of the Northwest Region (see Introduction)

COMPETENCY AREA 2. Tillage systems used for seedbed preparation.

1. Recognize the environmental and management factors that influence the selection and use of a tillage system.

2. Recognize how cropping systems, environment, and tillage affect soil residue cover.
   a. Crop residue and its relationship to seedbed preparation and quality.
   b. Understand how tillage systems can affect nutrient cycling and plant availability.

3. Recognize the different tillage systems and list the advantages and limitations of each, for example:
   a. conventional tillage.
   b. reduced till.
   c. strip till.
   d. no till.

4. Seeding depth factors.
    a. Describe seed, soil, and environmental conditions that affect recommended seeding depths.

COMPETENCY AREA 3. Hybrid and cultivar (variety) selection.

1. Understand the relationship between seed size, seed quality, test weight, and seed count.

2. Explain how storage time, handling, storage conditions (temperature and humidity), and seed processing affect seed quality.

3. Define seed dormancy and hard seed.

4. Recognize how local climates affect hybrid or variety selection.

5. Explain the importance of target plant populations and how to determine the seeding rate (lb/acre) needed to achieve that population based on that varieties seed count (per lb), germination, and expected mortality rate.

COMPETENCY AREA 4. Crop damage, mortality, and factors influencing replanting decisions.

1. Recognize how the type of damage due to hail, frost, flooding, drought, wind, insects, disease, and weed pressure can impact agronomic crops.

2. List climatic and plant factors that influence plant mortality or its ability to resume growth after injury.

3. Understand how to determine and evaluate ideal plant populations to determine if replanting is economically feasible.

COMPETENCY AREA 5. Cropping systems

1. Describe the function(s) of fallowing fields in crop production.

2. Recognize advantages and disadvantages of growing cover crops, nurse crops, and green manures.

3. Compare and contrast a monoculture system versus a crop rotation.

4. Outline what an organic cropping system encompasses.